

The Journal

OF

Nervous and Mental Disease

AN AMERICAN MONTHLY JOURNAL OF NEUROLOGY AND PSYCHIATRY

FOUNDED IN 1874

OFFICIAL ORGAN OF

The American Neurological Association

The New York Neurological Society

Boston Society of Psychiatry and Neurology

The Philadelphia Neurological Society and

The Chicago Neurological Society

EDITOR

Dr. WILLIAM G. SPILLER

MANAGING EDITOR AND PUBLISHER

Dr. SMITH ELY JELLIFFE

41 North Queen Street, Lancaster, Pa.

64 W. 56th Street, New York City

ADVISORY BOARD OF EDITORS

Dr. WILLIAM OSLER

Dr. CHARLES L. DANA

Dr. E. W. TAYLOR

Dr. CHAS. K. MILLS

Dr. M. ALLEN STARR

Dr. ADOLF MEYER

Dr. PEARCE BAILEY

Dr. HUGH T. PATRICK

Dr. JAS. J. PUTNAM

Dr. E. E. SOUTHARD

Dr. FREDERICK PETERSON

Dr. WILLIAM A. WHITE

Dr. LEWELLYS F. BARKER

Dr. HARVEY CUSHING

Volume 44, 1916

NEW YORK

64 West 56th Street

1916

142751
2515111

PRESS OF
THE NEW ERA PRINTING COMPANY
LANCASTER, PA.

P.C.
32
378

ORIGINAL CONTRIBUTIONS

	PAGE
War and the Nervous System. By Lewellys F. Barker	1
On the Symptomatology and Diagnosis of Intracranial Tumors of the Middle and Posterior Cranial Cavities, Growing from the Region of the Gasserian Ganglion and the Cerebello-pontine Angle. By Wil- liams B. Cadwalader	11
What do Psychiatrists Mean? By Augusta F. Bronner	30
The Coöperation of Psychologist and Physician. By Clara Schmitt	34
Hoffman's Sign or the "Digital Reflex." By Tedrow S. Keyser	51
Intramedullary Tumor of Cervical Cord. Diagnosis. Removal in Two- Stage Operation; Gradual Improvement. By F. X. Dercum and J. Chalmers Da Costa	97
The Cause of the Allorhythmic Type of Tremor in Paralysis Agitans. By Lewis J. Pollock	104
Werdnig-Hoffmann Early Infantile Progressive Spinal Muscular Atrophy. By M. A. Bliss	108
Family Spastic Paralysis. By John H. W. Rhein	115
Acroparesthesia. By James J. Putnam	193
Recurrent Poliomyelitis: Second Attack After a Period of Three Years. By E. W. Taylor	207
The Clinical Value of Defense and Muscle Reflexes: Importance of the Latter in Spinal Localization. By T. H. Weisenburg	217
Family Spastic Paralysis. By John H. W. Rhein	224
Obstetrical Paralysis. By John Jenks Thomas and James Warren Sever ..	289
On Convulsive Spasm of the Face Produced by Cerebellopontine Tumors. By Harvey Cushing	312
Facial Diplegia in Multiple Neuritis. By Hugh T. Patrick	322
Diffuse Sarcoma of the Pia Enveloping Entire Cord. By Peter Bassoe and C. L. Shields	385
Syringoencephalia, Syringoencephalomyelia. By William G. Spiller	395
Anosmia and Sellar Distension as Misleading Signs in the Localization of a Cerebral Tumor. By Harvey Cushing	415
Subacute Combined Sclerosis of the Spinal Cord Associated with Severe Anemia. By Williams B. Cadwalader	424
Hyperplasia of the Pineal Body	481
Types of Neurological Cases Seen at a Base Hospital	495
A Case of Postero-Lateral Sclerosis Following Streptococcus Infection— Transmitted to Rabbit as Myelitis	503
Report of Three Cases of Familial Spastic Paralysis	*505
Intentional Hypertonia	510
A Question of Epileptic Dementia With Recovery	517

CONTRIBUTORS TO VOLUME 44

Allen, C. L., Los Angeles
Atwood, C. E., New York
Barker, L. F., Philadelphia
Bassoe, P., Chicago
Bliss, M. A., St. Louis
Brink, Louise, New York
Bronner, A. F., Chicago
Brown, Sanger, H., White Plains
Da Costa, J. C., Philadelphia
Cadwalader, W. M., Philadelphia
Cushing, Harvey, Boston
Dercum, F. X., Philadelphia
Higier, Heinrich, Warsaw
Jelliffe, Smith Ely, New York
Keyser, T. S., Cleveland
Kraus, Walter Max, New York

Langdon, F. W., Cincinnati
Moore, J. W., Beacon, N. Y.
Patrick, Hugh T., Chicago
Pollock, L. J., Chicago
Putnam, J. J., Boston
Rhein, John H. W., Philadelphia
Sandy, W. C., Columbia, S. C.
Schmitt, Clara, Chicago
Sever, J. W., Boston
Shields, C. L., Salt Lake City
Spiller, W. G., Philadelphia
Taylor, E. W., Boston
Thomas, John Jenks, Boston
Weisenburg, T. H., Philadelphia
Yawger, N. S., Philadelphia

The Journal OF Nervous and Mental Disease

An American Monthly Journal of Neurology and Psychiatry, Founded in 1874

Original Articles

WAR AND THE NERVOUS SYSTEM¹

BY LEWELLYS F. BARKER, M.D.

In how far war and peace respectively have contributed to the progress of mankind is a topic that has long been discussed. Philosophical thinkers and historians form two groups, the members of one school emphasizing the power of reason and attributing human progress chiefly to it, the members of the other school laying stress rather on the power of selfishness and passion. In the Huxley lecture, recently delivered at Birmingham University, Lord Bryce, the former ambassador to the United States, has subjected the arguments advanced on both sides to a critical review, and has expressed the opinion that although war has, in some cases, been found compatible with progress, there is nothing to show that it has caused it. War, he said, will be found "not to have quickened but to have greatly retarded the upward march of man," for "progress has been chiefly due to thought and thought is not helped by war." Into the validity of the arguments on the two sides of this great question, I have no intention at this time to enter. All will admit that despite its horrors and notwithstanding the destruction of life and property that it entails, war gives rise to conditions that profoundly modify thought, feeling, and action, and sets pressing problems for the human intellect to solve. It is obviously the duty of the representatives of each division of human activities, in the midst of so much that is evil, to garner all available good. With this in mind, it has

¹ Presidential Address, American Neurological Association, Washington, D. C., May 8, 1916.

seemed to me fitting that, this year, the half-hour of the president's address to the American Neurological Association be devoted to the subject "War and the Nervous System."

Though doubtless we shall have to await the lapse of several years after the cessation of the war to evaluate fully the extension of knowledge of the nervous system accountable to this war, enough interesting papers have already appeared in the several belligerent countries, to permit us, I think, to judge fairly well of the directions, at least, in which neurological advances are being made. Time has not permitted me to study all the publications on the subject, but the papers that I have read in English, French and German journals indicate that we may expect an enlargement of our knowledge (1) of organic nervous lesions, (2) of functional nervous disorders, (3) of psychiatry, and (4) of normal psychology. I shall, therefore, refer briefly to the relations of the war to these four subdivisions of knowledge, each of which interests more or less every neurologist.

THE WAR AND ORGANIC LESIONS OF THE NERVOUS SYSTEM

Neurologists and surgeons have had manifold opportunity in this war to study the effects of shot and shell upon the most different parts of the central and peripheral nervous systems; they have observed the results of different methods of treating the wounds involving the nervous system and their after effects; and, as might have been expected, there has been corresponding enrichment of both diagnostic and therapeutic knowledge.

As far as wounds of the brain and spinal cord are concerned, reports indicate that, in general, the accepted views regarding topical diagnosis are being corroborated. One important new fact has been established, namely, that certain lesions of the central nervous system may be caused by modern high explosives without external wound.

The advances that have been made in therapy are perhaps even greater than those in diagnosis of central lesions. Thus surgeons are practically unanimous in urging the thorough investigation of every head wound, no matter how trivial it may at first seem to be; every such wound is widely opened up, and röntgenograms of the skull are made if possible. If a brain lesion be suspected, the skull is trephined; moreover such scalp wounds should never be sutured completely. In fractures of the base of the skull by projectiles entering through a natural cavity like the orbit or the auditory canal, the wound is merely disinfected.

Though the immediate effects of treatment of organic brain injuries have often been brilliant, the later histories of the patients have often been disappointing, for encephalitis frequently follows and the sequelæ are serious. It is feared that many cases of epilepsy will later be met with among those that have recovered from wounds of the brain.

In several places, a systematic effort has been made, in schools established for those that have suffered from brain injuries, to help soldiers to overcome as far as possible the limitations of function that have resulted. In how far such attempts at reëducation after organic lesion can succeed remains to be seen.

Far more fruitful than the studies of central injuries have been the investigations of lesions of the peripheral nerves. On the diagnostic side many interesting topics have been studied. Thus: (1) the differences in symptomatology when a nerve is totally severed and when it is only partially injured have been carefully worked out; (2) the criteria for distinguishing a true traumatic neuritis from an electrical sub-excitability and hyper-reflexia of reflex origin have been established; (3) the methods of determining whether psychogenous symptoms have been superimposed upon symptoms due to organic lesions have been elaborated; and (4) it has been shown that loss of power due to section of tendons or of muscles may sometimes be confused with paralysis due to lesions of the nerves themselves.

In the cases in which function fails to be reëstablished after nerve lesions, careful microscopical studies have shown that several distinct types of histological change occur and the methods of recognizing these several types clinically are being worked out as well as the kinds of surgical intervention suited to each.

Exact analyses of lesions of single nerves has confirmed the clinical individuality of each peripheral nerve and emphasized the fact that a knowledge of its several functions (motor, sensory, vasomotor, trophic, secretory) is essential to accurate diagnosis. Tables in which the clinical individuality of each of the several peripheral nerves of the upper extremity and of the lower extremity is made clear have been constructed and are now available for all neurological workers. Thus, in the arm, as everyone knows, the striking character of lesions of the N. radialis is paralysis; of the N. ulnaris, a specific claw-attitude of the fingers; and of the N. medians, pain with vasomotor and trophic disturbances. But the clinical individuality of each of these nerves is susceptible of description in much greater detail, and our knowledge in this domain has, through

studies made during the war, grown gratifyingly in extent and in precision.

The surgical treatment of fresh lesions of peripheral nerves has been markedly improved, but still greater advances have been made in the management of older lesions of nerves that require suture, neuroplasty or liberation from cicatrices for the restoration of function. Satisfactory methods of conducting the outgoing axones to the peripheral stump—indeed to that particular portion of the peripheral stump to which they should go—are being worked out, as well as devices for surrounding a nerve with materials that will prevent its being caught and compressed in cicatrizing tissue during the healing of the wound. Sterilizable electrodes for direct stimulation of nerve trunks in an operative wound have been invented, and the importance of the use of direct electrization of nerves during operations as a guide to the best surgical procedure to be adopted has become generally recognized.

THE WAR AND FUNCTIONAL NEUROSES

Many of the more important papers that have appeared during the course of the war deal with the functional neuroses. It has been pointed out that the war may be regarded as a huge experiment on the exogenous causation of functional nervous states under exceptional conditions: for in war we deal with a selected human material, namely, the youngest and healthiest adults of the several belligerent nations. Though it is recognized that the conclusions drawn from observations upon such special material dare not be transferred directly to general practice in times of peace, yet the studies that have already been made go far on the one hand toward confirming many ante-bellum views and on the other hand toward modifying other views that some had believed to be firmly established.

The old problem of the so-called "traumatic neuroses" with which we are all familiar in connection with the accidents of work has been the subject of vigorous and illuminating discussion. Though unanimity of opinion does not, even yet, prevail, still ideas are gradually being clarified, especially as regards etiology, differential diagnosis and treatment.

Contrary to what many expected, patients suffering from nervous states not due to organic lesions, though they have been fairly numerous, have, in reality, made up but a very small proportion of the total number incapacitated by the war. Considering the horrible conditions of modern warfare, the long exposure to artillery fire, and the deprivations that had to be borne, it is really surprising

to find how relatively restricted the number of functional neuroses reported has been.

The cases include (1) "traumatic neurosis" in which hysterical, neurasthenic, and hypochondriacal symptoms are often combined; (2) hysteria proper; (3) neurasthenic states; (4) combinations of organic nerve lesions with functional nervous states (so-called exaggerators) and (5) simulators and malingerers.

All the well-known types of functional nervous disturbances have been met with, including hemiplegia, monoplegia, paraplegia, contracture, hemianesthesia, mutism, stammering, amnesia, amaurosis, aphonia, and aphasia. Any one or several of these symptoms may occur in cases of hysteria or in traumatic neurosis with hysterical symptoms predominating. In the neurasthenic types, fatigability, headache, dizziness, insomnia, mental depression, irritability, sensitiveness to auditory and other stimuli, tremor, sweating, palpitation, etc., are the symptoms chiefly complained of. A group of cases known as "cramp-neurosis" (pseudo-spastic paraparesis with tremor, or innervation-spasm with tremor) has been described. The frequency with which lesions indisputably organic have been associated with nervous states of functional origin has been generally commented upon.

As to the question of simulation and malingering, there is considerable divergence of opinion. Those interested especially in organic neurology think that the number of simulators and malingerers is large, whereas those that have had more experience with the psychoneuroses, and especially those that have been well-trained in psychiatry, believe that the number of true or vulgar simulators (who deliberately create what appears to be disease, who know the falseness of it, and who can make it disappear by the will alone) is very small. Psychiatrists point out that simulation or malingering is itself a psychopathological symptom, and they also call attention to the fact that a trouble manifestly simulated on one day may cease to be simulation on the next; for just as a liar may be caught in his own snare and come through repetition of the lie to hold his fiction to be reality, so a person who has in the beginning simulated a contracture or a paralysis with the intention of deceiving the authorities, may come at length, through suggestion, to be the victim of his fraud. Most interesting examples of malingering have been discovered. Among them I may mention voluntary mutilation, especially of the fingers and toes; jaundice, simulated by swallowing picric acid; facial dermatitis; conjunctivitis; albuminuria, simulated by injection of egg albumen into the bladder; and phlegmons pro-

duced by coal-oil injections. For neurologists, however, the simulators that feign nerve lesions (paralysis, contracture, etc.) are the most interesting, and in such persons the difficulties of diagnosis have, sometimes, been very great indeed. There seems to be no objective character that permits one to distinguish "phenomena that are suggested" from "phenomena that are simulated," provided the simulator be adroit and keep a careful guard upon himself. As a rule, a skilled neurologist, who spends much time with his patients and subjects them to continued and attentive supervision, will be able to arrive at a just conclusion, particularly if he have had a psychiatric training.

The importance of minute neurological examinations by men of particular competence, who have special apparatus at their disposal, for all nervous cases, whether they be organic or non-organic, has become clear, and arrangements have been made, at least in some of the armies, for the speedy transfer of all nerve patients to specialized neurological services. This arrangement, obviously important for the nerve cases requiring surgical intervention, has also been proved to be especially advantageous for the functional nervous cases. In hysterical patients, for example, the symptoms can often be made to disappear very quickly if treated while in the nascent state by some one of the several forms of psychotherapy, whereas if the treatment is attempted in the general hospitals and especially if a wrong diagnosis be made, the symptoms may be tenacious and become very refractory to treatment; even if such patients, at a later stage, are transferred to competent neurologists or psychiatrists for treatment, the therapeutic problem may have become seriously complicated. The functional cases of neurasthenic type respond much more slowly—less "miraculously"—than the hysterical cases to psychotherapeutic treatment; but they, too, do far better in the specialized neurological services than when left to the management of physicians in the general hospitals.

When patients that are believed to be suffering from non-organic nervous troubles do not respond quickly to psychotherapeutic treatment in the specialized neurological services, they are transferred to a still more specialized service organized for persons in whom simulation and exaggeration are suspected; there, they are simultaneously subjected to the closest medical surveillance and to a rigid military discipline.

Disputes regarding the etiology of the several functional nervous states still go on; the relative importance of mechanical insult, of emotion, of covetous ideas, and of autosuggestion, has been variably

emphasized by different writers. Most neurologists seem to have been impressed with the quick recuperation of soldiers suffering from the functional neuroses and they attribute the discrepancy between experience in the war and that in peace-practice to the youth and vigor of the patients before their illness, to the absence, as a rule, of disposition, to the military environment in which there is no excess of sympathy or of anxious solicitude, and, finally, to the lessened opportunity for the development of those "ideas of covetousness" that play so important a rôle in prolonging these illnesses in peace-practice. As an aid in limiting the number of relapses and in preventing a patient with recurrence having his illness mistaken for organic disease, it has been recommended that soldiers that have recovered from a functional neurosis have inscribed upon their military papers the statement that they have "suffered from a neuropathic trouble that is not organic in origin, is not serious, and is curable by psychotherapy." Such a diagnostic label prevents confusion with those nervous affections the organic reality of which is incontestable.

WAR AND THE OUTSPOKEN PSYCHOSES

Though much that I have referred to under the heading of the functional neuroses belongs in the domain of psychiatry, it is desirable that something should be said regarding the more outspoken psychoses that have been met with among soldiers in the great war. Here, too, we meet with a surprise in the small number of cases of insanity that have been reported. During the period of mobilization, it is true, suicide and alcoholic deliria were frequently observed, and after the campaign was well under way a certain number of psychoses made their appearance, owing doubtless to the great strain to which all soldiers were subjected. Among the psychoses that have developed in the war may be mentioned hysterical twilight states, different forms of dementia præcox, and dementia paralytica. Occasionally, psychoses of the manic-depressive group have been observed but these appear to have been seen more rarely than other forms. Most authors agree that there are no peculiar "psychoses of war"; they say that the psychoses met with during war are of the same types as those seen in peace times, though it is admitted that the contents of the delusions and the character of the hallucinations may be modified by the environment of war. It is further asserted that by far the majority of those soldiers in whom psychoses have been observed had either shown symptoms of the disease at some period before the war or given evidence of definite predisposition to mental disorder.

The way in which, in belligerent countries, the nervous systems of combatants and of non-combatants alike have stood the stress of the war, discredits the theory that the human race has undergone marked degeneration: indeed, the evidence seems to favor the view that the human nervous system is today better able to stand strain than ever before in its history.

THE WAR AND INDIVIDUAL AND COLLECTIVE PSYCHOLOGY

No generation ever had better opportunity than ours to study the psycho-biological reactions occasioned by war, and there is good reason to hope that during the war and afterwards the study of individual and of collective psychology will be greatly stimulated and advanced. For the materials we have only to turn to our own thoughts, feelings and impulses, to the behavior of those with whom we come in contact, and, above all, to the records in daily newspapers, magazines, and in current books, of the knowing, the feeling and the striving of individuals and groups in both belligerent and neutral countries. Something regarding the psychology of the time can, perhaps, be gleaned from the medical journals, but the richer harvest is to be garnered from "letters to the editor" written by deeply-stirred individuals, from magazine articles and from books, in which all phases of the war are discussed, by militarists, pacifists, economists, philosophers, politicians, university professors, diplomats, international lawyers, psychologists, and *literati*. The most cursory examination of these materials will quickly convince anyone trained to think biologically that to understand this war, it is necessary to examine not the thoughts alone, the feelings alone, or the strivings alone, of the several peoples concerned, but all the stimuli and all the psychological reactions together, namely the combined thinking, feeling, and striving, that represent the instincts, the sentiments, and the ideals of individuals and of nations. Students of the nervous system will, I believe, be eager to avail themselves of the great opportunities afforded by this war for the collection of data upon, and the organization of knowledge concerning, individual human behavior on the one hand and national behavior on the other, preceding, during, and after the war.

The comparative psychologists have, it seems to me, given us the clues for approaching the materials and for constructing from the facts a useful body of knowledge. The evolutionary psychology of the nineteenth century has made it very clear that adequately to understand human motives, human behavior, and the complex mental life of society, we must first become familiar with the funda-

mental instincts that human beings share with other animals. They have shown us that it is in the instincts and in other native tendencies that we must look for the bases of character and will, not only in persons, but also in nations. They have given us the rudiments of a science, social psychology, that may ultimately inform us how the complex nervous system of man, with the animal instincts as its basis, permits of the development of human personality, of the moralization and socialization of the individual, and of the formation of sentiments and ideals that lead men to behave as we see them do, in families, in communities, and in nations.

It has been largely through comparative psychology that we have been made familiar with the instinct of flight and its emotion of fear, the instinct of repulsion and the emotion of disgust, the instinct of curiosity and the emotion of wonder, the instinct of pugnacity and the emotion of anger, the instinct of self-abasement and the emotion of subjection, the instinct of self-assertion and the emotion of elation, the parental instinct and the tender emotion, the instinct of feeding, the instinct of sex, the gregarious instinct, the instinct of acquisition, and the instinct of construction. Through comparative psychology, too, we have learned much regarding the importance of certain general native tendencies like sympathy, suggestion, imitation, play, habit-formation, and temperament. Further, the study of human psychology has shown us how the primal emotions of two or three instincts may be combined into less simple emotions; thus admiration is a combination of wonder and submission, scorn is a compound of anger and disgust, whereas in the emotion of revenge we see a union of self-assertion and anger. The study of the human mind has revealed, too, the existence of mechanisms through which still higher syntheses known as *sentiments* arise, as well as the constitution of the more complex emotions that accompany them. In a typical sentiment like the love or the hate of a person or of a country, several of the primary instincts and their accompanying emotional tendencies are organized into a system of thoughts, feelings and impulses that centre in a definite object. The development of such sentiments is of enormous importance for the character and conduct of persons and of society. It is particularly the growth of self-consciousness and of the self-regarding sentiment under the moulding influences of the social environment that is significant for the understanding of the origin of the moral ideas. We have begun to understand how a human personality develops. Starting with simple instincts, developing through sentiment-formation, and especially through the growth of the self-regarding senti-

ment, the child is influenced first by rewards and punishment, then by parental praise and blame, and later by public approval and disapproval; finally, advancing to the higher planes of social conduct, the adult may become able not only to resist the promptings of his strongest instinctive impulses, but also to stand up against public opinion and to do what he judges to be right and in accord with some ideal of conduct that is in defiance of it.²

Often a sentiment will become crystallized in a phrase or a sentence that, through the mysterious influence of crowd psychology, may be used on occasion profoundly to stir a whole people. Every war has its instances. We need only recall the sentiment of democracy at the time of the French Revolution with its watchwords *Liberté, égalité et fraternité*, the sentiment of naval supremacy in England with its song *Britannia rules the waves*, the indignation of the people of the United States at one time toward Spain with the injunction *Remember the Maine*, the love of the German people for the ideal known as *das Deutschtum* voiced in the phrase *Deutschland über alles*. In the United States, at the present moment, a systematic effort is being made, by appealing to our instincts and to sentiments that already exist, to cultivate a new functional system of mental dispositions that will result in better readiness for national defence; the watchword *preparedness* symbolizes a comprehensive synthesis of primal feelings and strivings.

The assertion that the native propensities of man have not grown weaker under a long period of civilization is not likely to be challenged at a time such as that in which we live. The veneer of law and custom has been scratched only to discover, underlying it, primitive man. Before the war duelling had disappeared but individual pugnacity was not always controlled. The terrific effects of collective pugnacity, we are now having unprecedented opportunity to witness. If the time shall ever come when the collective combat of nations will be rendered as unnecessary as has become the bodily combat of individuals, it will doubtless have been preceded by a long period in which it was gradually discouraged by the evolution of international law and custom. Life and growth necessitate change. Nations cannot continue to exist without change. Possibly neurologists and psychiatrists studying instincts, sentiments and ideals may discover methods by which necessary changes may be affected with less that is horrible than seems unavoidable today.

² See W. McDougall's *Introduction to Social Psychology*; also, A. F. Shand's *Character and the Emotions*; M. Ribot's *Theory of the Passions*; and G. F. Stout's *Groundwork of Psychology*.

ON THE SYMPTOMATOLOGY AND DIAGNOSIS OF
INTRACRANIAL TUMORS OF THE MIDDLE AND
POSTERIOR CRANIAL CAVITIES, GROWING
FROM THE REGION OF THE GASSERIAN
GANGLION AND THE CEREBELLO-
PONTINE ANGLE¹

BY WILLIAMS B. CADWALADER, M.D.

INSTRUCTOR OF NEUROLOGY AND NEUROPATHOLOGY AT THE UNIVERSITY OF PENNSYLVANIA SCHOOL OF MEDICINE; CLINICAL ASSISTANT TO THE PHILADELPHIA ORTHOPEDIC HOSPITAL AND INFIRMARY FOR NERVOUS DISEASES, PHILADELPHIA

Intracranial tumors that arise from structures at the base of the brain, within the middle and posterior fossæ of the skull, may produce certain symptoms that are sufficiently clear cut to enable one to reach a positive conclusion as to the exact situation of the tumor.

It is my purpose to record here the observations made upon nine cases in which the tumor was shown, either by operation or by autopsy, to have occupied the region of the so-called cerebellopontine angle or the region of the Gasserian ganglion, and to show that tumors growing from the latter region may be different in nature from those growing from the cerebellopontine angle, and produce signs and symptoms which can be differentiated during the lifetime of the patient. This is of the greatest importance because if surgical intervention is contemplated, a tumor in the middle fossa can be reached more readily by a lateral opening in the skull, whereas the cerebellopontine angle can only be approached through the sub-occipital region.

For the material upon which this study is based I am indebted to Dr. William G. Spiller, who has very kindly placed at my disposal the specimens in his laboratory at the University of Pennsylvania.

Two of these cases (Cases 1 and 7) have been referred to in an article published by Dr. Spiller (*Journal American Medical Association*, February 19, 1910, p. 579).

EARLY SYMPTOMS

The symptoms produced by tumor in the cerebellopontine angle, like those of growths in other localities, may be divided into two

¹From the Laboratory of Neuropathology of the University of Pennsylvania.

main groups; namely, the general symptoms of tumor and the localizing signs.

For diagnostic purposes the most valuable information is that concerning the exact order in which the symptoms arise; unfortunately, however, it is not often that patients present themselves for examination until the symptoms are more or less well defined, and it is, therefore, seldom possible to determine which structure was the first to be affected. Conclusions on this particular point may be open to reasonable doubt, but the importance of acquiring a knowledge of these facts is obvious. Of the cases here recorded with the exception of case 8 so far as could be determined the earliest symptoms were those that could be attributed to intracranial pressure, and they were not, therefore, of localizing value.

Varying degrees of nausea, vomiting, vertigo, headache and failing vision were among the earliest symptoms in eight cases. In addition to these ataxia developed early in one case (Case 1); convulsions occurred early in one case (Case 6); and in one instance (Case 5) spasticity seems to have been the first symptom complained of. In one case (Case 8) twitching of the muscles of the right side of the face was the first symptom noted, and even preceded any evidences of intracranial pressure.

Henschen² found that the most frequent early symptoms were those of general pressure, in particular, headache. This latter symptom occurred early in 60 of Henschen's cases; deafness was next in frequency in 40 cases; and other disturbances in hearing, such as noises, whistling, etc., within the ear occurred 25 times; vertigo was present in 25 cases. Vomiting and disturbances of locomotion were early symptoms in 10 cases.

OPTIC NERVE

Choked disc was present in all but one case (Case 4), and in this instance no ophthalmoscopic examination seems to have been made. In one case (Case 6) papilledema was greater on the side with the tumor, but in another instance (Case 3) it was slightly greater on the side opposite the growth. In all the other cases, however, the degree of swelling seems to have been the same on both sides. In one case (Case 2) transitory blindness preceded the development of choked disc. Without doubt partial temporary blindness may very often precede the development of papilledema, but it is not frequently recorded, probably because patients are not seen sufficiently early. That choked disc is not necessarily an early sign of intra-

² Ueber Geschwülste der hinteren Schädelgrube, insbesondere des Kleinhirnbrückenwinkels, Jena, 1910, p. 225.

cranial pressure is shown by Case 9, in which the symptom was not discovered until nearly four years after the first manifestations of intracranial disease were recognized, although frequent ophthalmoscopic examinations had previously been made.

Direct involvement of the optic nerves was not observed, nor was there any evidence of direct pressure upon the occipital cortex, although in one instance (Case 7) there had been extreme displacement of the cerebellum, the occipital lobes being pushed apart by the tumor, and the tentorium having been subjected to great tension.

THIRD, FOURTH, AND SIXTH CRANIAL NERVES

In one case (Case 1) the third nerve was severely compressed on the affected side, and had caused almost complete oculomotor palsy with moderate exophthalmos. In the remaining cases the third and fourth cranial nerves had escaped.

Bilateral nystagmus occurred but twice (Cases 3 and 4), and was increased on looking toward the side opposite the tumor.

In Cases 2, 5, 8, and 9 none of the motor ocular nerves was affected.

In two cases (Cases 4 and 6) the external rectus muscle was paretic on the same side as the growth.

In his monograph Henschen (1) states that disturbances of the motor functions of the eyeball are of particular importance in the clinical picture of acoustic tumors, and claims that they were observed in 90 out of 115 cases to which he refers. He asserts that the third, fourth, and sixth nerves were intact in only a few cases. On reviewing Henschen's tabulated list of cases I find that the third nerve does not appear to have been completely paralyzed in more than two or three instances. Deviation of the eyeball to one side is all that is usually recorded. In about 20 of this observer's cases the abducens never was totally or partially paralyzed, and in 10 paralysis of the associated ocular movements was observed.

In the cases recorded by Dana and Elsberg (2), Jumentie (3), Hellsten (4), Lueke (5), Marx (6), Pallasse (7), Veasey (8) and Kocher (9) the third, fourth and sixth nerves were not affected.

Nystagmus was described in those cases observed by the authors previously mentioned, and in those seen by Berlstein and Nowicki (10), Geerts (11), and Weygandt (12).

FIFTH NERVE

The root of the trigeminal nerve may be severely compressed as it makes its exit from the pons. The condition of the fifth nerve

was recorded in seven of my cases, and in three the function of the nerve was definitely but incompletely disturbed (Cases 1, 2, and 7). In three cases (Nos. 1, 2, and 4) the action of the masseter muscle on the side with the growth was recorded as being weak, whereas objective sensation was not affected. In Case 2 a sensation of numbness in the face was complained of, and in Case 7 considerable pain in the face had been present. This latter might have been due to stretching of the fifth nerve, which was shown at autopsy to have been attached to the tumor, but not to have been involved by it.

In Weisenburg's case there was severe pain in the face stimulating *tic douloureux*. In one case (Case 9) both subjective and objective sensory disturbances were greatly affected, probably because the tumor was growing in the middle fossa of the skull and had implicated the Gasserian ganglion. In the cases recorded in the literature, Henschen found incomplete involvement of the sensory branch of the fifth nerve to have been very common. In his tabulated list, however, anesthesia is recorded in only sixteen cases. The state of the fifth nerve is recorded by him, as a rule, as hypesthesia, paresthesia or anesthesia of portions of the face or of the cornea. The differentiation between actual severe objective sensory disturbances in the whole area of the distribution of the fifth nerve, and paresthesia or hypesthesia of the parts supplied by one or two divisions of the fifth sensory nerve is important, and will be referred to further on. In twenty of Henschen's cases the motor trigeminal root was affected. In the case of right-sided cyst reported by Dana and Elsberg there was slight anesthesia of the face on the side with the lesion, together with loss of the conjunctival reflex and slight weakness of the right motor branch of the fifth nerve. Veasey found severe sensory disturbances in his case, but severe or complete anesthesia in the distribution of the fifth nerve was not found in the cases reported by Lindner (13), Lueke, Marx, Rhese (14), Korn (15), and Kocher.

SEVENTH NERVE

In seven of my cases the function of the seventh nerve was recorded and in all but one (Case 9) it was severely affected. Clonic or involuntary twitching movements preceded paralysis of the face in one case (Case 8), Spiller (16), Weisenburg (17), have referred to this and more recently Cushing (18). Usually voluntary movements of the face on the same side as the tumor were not so well performed as on the opposite side. The paralysis was of the peripheral type, but the muscles of the lower portion of the face were generally more severely affected than those of the upper portion.

The condition of the seventh nerve was recorded in 100 of Henschen's cases, and in all but 15 cases its function was affected.

EIGHTH NERVE

Disturbances of hearing are of the greatest importance in determining the presence of a tumor in the cerebellopontine angle. In all my cases except two (Cases 1 and 5) it was positively ascertained that deafness of nerve origin had existed.

Hallucinations of hearing may constitute an early sign of these tumors, as in Case 8; when they exist, they are the result of nerve irritation from beginning pressure; when this pressure increases, however, the eighth nerve will be destroyed, and the patient will become entirely deaf. Nerve-deafness is probably the most reliable localizing sign; unless it occurs at some time during the course of the disease, the diagnosis of tumor in the cerebellopontine angle may be somewhat uncertain. Of the cases reviewed by Henschen, deafness was recorded in 115.

Deafness occurred in a case of cyst in the cerebellopontine angle reported by Dana and Elsberg, and was present also in cases of tumor in this region described by Jumentie, Berstein and Nowiki, Lindner, Lueke, Marx, Pallasse (second case), Rhese, Veasey, Geerts, Kocher, Korn, Mortiz (19), Zange (20), Fraenkel & Hunt (21), and others.

NINTH, TENTH, AND ELEVENTH NERVES

Of the remaining cranial nerves, there is little of importance to be said. In Case 7 the ninth nerve was evidently affected, but in the remaining seven cases no disturbances in the function of these cranial nerves were observed. These findings seem to be in accord with Henschen's recorded observations. This observer found disturbances of taste and of motor power in 30 out of 115 cases, and disturbances of deglutition in 20 cases.

MOTILITY, REFLEXES, ETC.

- * Motor disturbances and cerebellar symptoms should not be uncommon findings in cases of tumor of the cerebellopontine angle, because of the pressure exerted on the motor tracts as they pass through the pons, and owing to the proximity of the growth to the cerebellum. It would seem logical to assume that the size of the growth would be the determining factor. Ataxia is recorded in all my cases but two (Cases 1 and 6) and here again the notes were not

complete. Of the cases recorded in the literature, the vast majority showed ataxia. Of Henschen's 115 cases, of only two could it be positively stated that the gait or station was not abnormal, and in only 20 of his 90 collected cases were motor disturbances absent.

NATURE OF THE TUMOR

Tumors growing from the cerebellopontine angle are almost invariably of the connective-tissue type. While it is true that gliomatous growths have been observed in this region, as in the cases recorded by Stewart and Holmes, which are quoted by Henschen, yet such growths are the rare exceptions, and immediately suggest the much debated definition of that unfortunate term, "gliosarcoma." Of the 115 cases embraced in Henschen's tabulated list, fibrosarcoma occurred in 25; fibroma in 16; neurofibroma in 14; and 21 were classified as mixed types of sarcoma. In my cases the growths were classified as fibromata, fibrosarcomata, or endotheliomata, but so reliable an authority as Mallory regards fibrosarcomata as endotheliomata.

Without entering into a detailed discussion of the histologic characteristics of these growths, it is sufficient for present purposes to point out that, under healthy conditions, two varieties of tissue predominate in the structure of the cerebellopontine angle; that is to say, the endothelium of the blood-vessels, lymphatics, and particularly the endothelial lining cells of the dura, and the connective tissue of the meninges themselves. Perhaps most important of all is the fact that, between the sutures that have united to form the internal auditory meatus, there remains, even in adult life, considerable connective tissue of the embryonal type, and it is probably in this tissue that most of these tumors have their origin. Unlike the other cranial nerves, the acoustic nerves are surrounded by a special type of connective tissue, and are prone to develop connective-tissue growths; furthermore, the other cranial nerves, with the exception of the fifth nerve, are not the seat of new-growths, and are not so completely enveloped with this type of connective tissue. In general it is true that the presence of a tumor may be due to an alteration in the histo-mechanical and histo-chemical conditions of growth. Tumors must take their origin from a definite point, and subsequently extend over more or less wide areas to involve neighboring structures. Their histologic structure may differ from that of the tissue in which they arise. This characteristic is not, however, invariable.

DIAGNOSIS

In making a focal diagnosis of a tumor situated in the cerebello-pontine angle the most important single sign is deafness of nerve origin on the side with the lesion. As has previously been pointed out, the eighth nerve is, as a rule, the only cranial nerve from which tumors grow, and indeed they are quite common in this situation. Tumors originating from any of the other cranial nerves within the cranial cavity, with the possible exception of the trigeminal nerve or the Gasserian ganglion and the optic nerve, are so rare that, when they are observed, they should be regarded as curiosities. It is because of the embryonal connective tissue that is present at the internal auditory meatus and that is so closely associated with the eighth nerve as it passes through this connective tissue that tumors are so prone to develop at this point. It is remarkable that, in some cases at least, the seventh nerve escapes entirely. Zange states that in four cases in which a careful histologic study had been made the seventh nerve was found to be intact.

It is somewhat difficult to generalize as to the exact sequence in which other signs and symptoms develop but it would seem as if, in addition to deafness and facial paralysis, ataxia and incoördination, due to pressure upon the cerebellum, and labyrinthine disturbances, together with evidences of weakness of the limbs of the opposite side, and usually, the occurrence of some spastic phenomena, go to make up the most common disease picture of tumors of the cerebellopontine region. The third nerve usually escapes, in most cases, the fifth partially escapes, but the sixth, ninth, tenth, and eleventh nerves may be affected on the same side as the lesion. When marked disturbances of the function of the trigeminal nerve occur early in the disease, some confusion may arise as to the exact interpretation of this sign. The fifth nerve root itself may not be really directly involved by the tumor. On the other hand, if the face is found to be profoundly anesthetic, as in my Case 9, the question arises as to whether or not the Gasserian ganglion is implicated.

TUMORS OF THE GASSERIAN GANGLION

The Gasserian ganglion lies on the anterior surface of the petrous portion of the temporal bone, and is therefore within the middle cranial fossa; it is separated from the posterior fossa by the dura, where it is firmly attached along the crest of the petrous portion of the temporal bone. Furthermore, the ganglion is enveloped above and below by the dura itself. For these reasons fibromatous tumors

growing from the cerebellopontine angle are not prone to extend far enough forward to encroach upon the structures lying within the middle cranial fossa.

Occasionally tumors grow in the middle fossa, springing either from the connective tissue of the Gasserian ganglion itself, as Hellsten believed was true in his case, or from its enveloping membranes. Two cases of tumor growing from the Gasserian ganglion were observed by Spiller (22). In his first case he found the most important features were: "Paralysis of the right fifth nerve, with severe pain as the first symptom, then blindness of the right eye, and later of the left eye, with optic neuritis; impaired mentality when the pain was severe, inequality of pupils, the right being the smaller, loss of reaction to light, probably from the optic nerve disease, bilateral deafness, weakness of the soft palate on the right side, impairment of the sense of smell, loss of patellar and Achilles tendon reflexes, ataxic gait and station, weakness of the left third nerve, and paralysis of the right sixth nerve. The facial nerve was not affected."

The important features of Spiller's Case 2 were: "The history of recent exposure to syphilis, the pain and weakness in the distribution of the right fifth nerve, impaired hearing on the right side, lessened sweat secretion on the right side of the head, inequality of pupils, sluggish iridic reaction to light, with prompt reaction to accommodation, weakness of the right external rectus muscle, some retraction of the right eyeball, and narrowing of the palpebral fissure. Dr. Randall's examination made the right-sided deafness of doubtful diagnostic value, but the discovery of the tumor in the nasopharynx seemed to point to intracranial tumor as the cause of the symptoms. This possibility was strengthened by the excision of the enlarged lymph-gland of the neck, and the discovery of the endothelioma within it. The diagnosis made by him was tumor implicating the right Gasserian ganglion, probably endothelioma. The right sixth nerve evidently was affected. The sympathetic paralysis of the right side of the face might be explained by the lesion of the fifth nerve."

Hofmeister and Meyer (quoted by Spiller) found that in their case pain in the course of the distribution of the fifth nerve was the first symptom, followed by weakness of the muscles of mastication on the same side, and loss of objective sensation in this distribution, choked disc in the right eye, paralysis of the right third nerve and probably of the fourth, sixth, and eighth nerves. Spiller states that: "Tumors beginning in the region of the Gasserian ganglion appar-

ently have their origin in the dura, and have the character of an endothelioma or sarcoma, the distinction between these two forms depending largely on the interpretation of the growth by each investigator. Such a tumor is usually of large size, and while at first may be confined to the region of the Gasserian ganglion, it soon extends chiefly as a flat growth, over the base of the middle fossa, possibly into the posterior fossa, and into the orbit. It has a tendency to extend into the base of the temporal lobe above it without infiltrating the brain, although firmly adherent to it. This implication gives no symptoms, unless it be the cause of the loss of smell. Loss of smell is not uncommon in brain tumor when intracranial pressure is much increased, but when the base of the temporal lobe is implicated, the lesion is near the supposed center of smell. Endothelioma arising in the dura not infrequently implicates the adherent bone."

The significance of pain and anesthesia of the face preceding the onset of deafness may not always be clear for it can indicate pressure or irritation of the fifth nerve within the posterior cranial fossa or it can be caused by a tumor involving the Gasserian ganglion.

Tumors of the Gasserian ganglion invariably cause some pain or objective disturbance of sensation as an early sign, that is preceding any deafness or, at least, before it can be recognized. In Cases 8 and 9 there was much uncertainty, in Case 9 particularly, for signs of fifth nerve involvement were the most conspicuous features. Deafness probably had existed first, yet during the lifetime of the patient it had been exceedingly difficult to prove it. Judging by the character of the tumor removed at operation, it is not improbable that the growth had extended from the region of the eighth nerve in the posterior cranial fossæ along the base of the brain into the middle fossa and had involved the Gasserian ganglion; the tumor was an endothelioma and may have arisen from the dura and had probably not grown primarily from the eighth nerve.

The case reported by Weisenberg (23) is instructive. He described a case with necropsy in which a tumor situated in the cerebellopontine angle, sarcomatous in character, pressed first upon the sensory root of the fifth nerve, causing symptoms of *tic douloureux*. It is very remarkable that in this case the deafness had apparently not occurred, yet after death the eighth nerve was found to be firmly attached to the tumor and was shown to be considerably degenerated when examined microscopically. I know of no other case of tumor originating in the so-called cerebellopontine angle that had not caused some disturbances of hearing.

Plummer and New (24) reported a case of tumor of the Gasserian ganglion in which pain in the face was the first symptom, followed by partial loss of the sense of smell, dilatation of the right pupil, partial palsy of all the intrinsic muscles of the eye with partial ptosis, without any evidence of deafness.

The most important differentiating signs in tumors of the Gasserian ganglion appear to be severe sensory disturbances, both subjective and objective, of the face on the same side as the lesion; sympathetic paralysis of the eye on the same side, third nerve paralysis, disturbances of smell, unilateral visual disturbances on the side of the growth, and ataxia. All these signs may precede the development of deafness, or deafness may be absent, and none of these signs except the ataxia are common symptoms of tumor of the cerebellopontine angle.

The importance of recognizing these different types of new growths become obvious if surgical interference is contemplated.

In conclusion I would call attention to the fact that there is a particular type of tumor that grows from the dura at the base of the brain in the middle and posterior cranial fossa which frequently involves the bones of the skull and does not infiltrate the brain substance, but does embrace the cranial nerves. These tumors are endotheliomata and are sometimes associated with cystic formations. They may arise from the region of the Gasserian ganglion and extend backward as a flat, slow-growing mass and subsequently involve the seventh and eighth nerves, thus producing symptoms that resemble the true fibromatous tumors which always arise from the eighth nerve in the cerebellopontine angle. Cases 8 and 9 belong to this group.

CASE 1.—(Laboratory No. 421.) *Cerebellopontine Tumor.*

Symptoms.—*Ataxia, weakness of the seventh nerve, left third nerve, and motor branch of the fifth nerve; cerebellar attitude, optic atrophy, and extreme hunger. Deafness was not recorded.*

E. M., female, aged twenty years, was admitted to the Philadelphia General Hospital, May 1, 1907, and died January 8, 1908, in service of Dr. Spiller.

Her sight had been poor since she was seven years old. Frontal headache had existed for about three years, but had grown much worse during the two months preceding her entrance into the hospital. Two weeks before any notes were taken she began to experience difficulty in walking and in speaking. When she came to the hospital she was unable to walk or to stand alone, and showed a tendency to fall backward. The voluntary power in the lower limbs was, however, fairly good. She was markedly ataxic, even in the heel-to-knee test. The patellar reflexes were exaggerated, and

ankle-clonus and upward movement of the toes in the Babin-ski test were elicited on each side. The movements of the upper limbs were ataxic, and the grip of each hand was weak. The biceps reflex was exaggerated on both sides. The speech was whining. Weakness of the lower part of the left side of the face was present. The tongue, when protruded, deviated to the right. The right masseter muscle was weak, and when the mouth was opened the lower jaw deviated slightly to the right. These symptoms evidently were caused by pressure upon the left cerebral peduncle and left upper part of the pons.

Reaction of the iris to light and in convergence was lost in each eye, and the left eye bulged outwards. Swallowing was difficult. The mentality became much impaired, and stupor was pronounced. The body was in the "cerebellar attitude" described by Hughlings Jackson. On examination, Dr. Hansell found that the late stage of high-grade optic neuritis passing into atrophy was present in both eyes. The left eyeball could be moved only to a limited degree, the movement being directed downward, and slight ptosis was present on the left side. Late in the disease the right eyeball deviated outward. The right upper limb was slightly weaker than the left. The appetite was increased, and a second dinner was demanded almost daily. The upper limbs became markedly rigid, the fingers were flexed into the palms, and the forearms were flexed on the arms across the chest. The lower limbs also became rigid on extension, and the feet were overextended.

A tumor measuring 9 cm. anteroposteriorly by 6 cm. laterally was found in the left cerebellopontine angle. The growth was nodular and well defined. It evidently had its origin in the dura at the base of the brain, and by pressure alone had affected the nerves coming from the left side of the medulla oblongata and pons. The cerebellum had been considerably displaced laterally. The tumor had forced the occipital lobes apart and had depressed the basal portion of the occipitotemporal lobe. The tentorium cerebelli must have been greatly stretched. A large part of the periphery of the tumor, especially the upper portion, was covered with a dense fibrous membrane, and a section of the tentorium projected mesially from this membrane. There was marked pressure upon the third nerve on the left side but the nerve on the right side was not implicated. The posterior and anterior horns of the left lateral ventricle were greatly compressed. The right lateral ventricle was everywhere dilated. The tumor was found to be a fibrosarcoma.

CASE 2.—(Laboratory No. 345.) *Right-sided cerebellopontine Tumor.*

Symptoms.—*Ataxia, failing vision, nausea and vomiting, deafness on the right side, headache, seventh nerve weakness on the right side, early disturbances of the sensory branch of the fifth nerve on the right side, "numbness," and choked disc.*

Following a decompression operation the headache and vomiting disappeared and the choked disc subsided.

E. D., female, aged twenty-four years, in service of Dr. Mills. About two years ago the patient noticed that her limbs were weak, and that she staggered in walking, although she did not feel dizzy. About one year ago she discovered that her vision was failing. At this time attacks would occur during which, for a few minutes, everything would seem to be black; when these attacks passed off she could see perfectly well again. At about the same time there were attacks of nausea and vomiting, and the patient grew slightly deaf in her right ear. For the past three months she had had considerable headache, which is sometimes dull, and at other times sharp and shooting in character. At the time of her admission, February 16, 1905, she is practically blind and unable to walk.

On being asked to show her teeth it is noticed that the right corner of the mouth is not drawn up nearly so well as the left, and that in drawing up each side separately, the movements on the right side are distinctly less than on the left. On closing her eyelids forcibly the resistance to passive movements is weaker on the right side than on the left; the masseter muscle seems to contract equally as well on one side as on the other. The ocular movements are normal, and there is no distinct nystagmus. There is no disturbance of pain and tactile sensations in the face, although she complains of a "queer" feeling on the right side of the face, including the right side of the mouth; this is described as a "numb" feeling, as though the parts were "asleep." Further examination gives the impression that both the left temporal and the masseter muscles contract slightly more than the right, although it was found subsequently that the muscles on both sides respond equally well to the faradic current. The tongue is protruded normally, and there are no fibrillary tremors. The right eyelid seems to be slightly more prominent than the left.

In the upper extremities the grasp of each hand is normal. The biceps reflex is normal on each side; the triceps reflex and the wrist reflexes are not distinct on either side. The sensations for touch and for pain are normal on both sides. There is slight ataxia on each side, which is a little more marked on the right than on the left.

In the lower extremities the patellar reflex responds a little more promptly than normal on both sides. There is no ankle clonus. The Babinski sign is uncertain on both sides, as the patient resents any attempt to irritate the sole of the foot. The Achilles tendon reflex is absent on both sides. There is no hemiasynergy, nor is there any weakness in either limb. The gait is slightly ataxic, being specially noticeable when she turns. In walking the patient staggers more to the left than to the right; when her feet are placed close together, she staggers almost as much when eyes are open as when they are closed.

On testing the hearing Dr. Randall finds but little hearing in the right ear, either by the air or bone conduction tests, except for the Galton whistle. Tests are slightly contradictory, but indicate middle ear disturbance on the right side, complicating partial right acoustic paresis. On the left side hearing is not impaired.

Ophthalmic examination shows that the pupils are dilated. The right pupil responds to light thrown in from the temporal side, in which position it is recognized; the left pupil does not respond to light, the eye being blind. Choked disc is present on both sides; elevation on the right side is about 6 D., and on the left, 7 D. The nerves show beginning atrophy. The eye movements are carried out in a jerky manner, the muscles acting feebly, and the eyeballs returning to the primary position immediately. There is no paralysis of the ocular muscles.

Under ether anesthesia Dr. Frazier performed a suboccipital craniectomy, removing the bone over the right cerebellar hemisphere. Owing to profuse bleeding, it was decided to discontinue the operation at this stage until such a time as the patient had fully recovered from its effects.

Two months later a radical operation was performed which was followed by death within five days. Following the decompression operation the choked disc subsided, from 7 D. to 3 D., although, unfortunately, the optic atrophy was so far advanced as to preclude the possibility of restoring vision. The hearing improved somewhat after the operation, and the nausea and vomiting ceased. The headaches disappeared almost entirely, and the patient was able to get up and walk about the ward with but little assistance, but died suddenly five days later.

CASE 3.—(Laboratory No. 342.) *Cerebellopontine Tumor.*

S., male, aged forty-six years.

The patellar reflex and Achilles tendon reflex were lost, and the gait was ataxic. Among other symptoms there were headache, dizziness, optic neuritis, nystagmus, and paresthesia of the left side of the face. A diagnosis of cerebellar tumor was made. A palliative operation over the cerebellum was performed by Dr. Edward Martin in 1902, after which the patient's condition was much improved. Death occurred in 1906, and on autopsy a fibroid tumor was found in the left cerebellopontine angle, pressing upon the left side of the pons, medulla oblongata, and cerebellum.

CASE 4.—(Laboratory No. 338.) *Cerebellopontine Tumor.*

Symptoms.—*Vertigo, failing vision, ataxia, left eighth nerve deafness, left motor fifth nerve weakness, left seventh nerve weakness, left external rectus and right internal rectus weakness; nystagmus with movement more marked to the right.*

F., C., female, aged twenty-four years. In service of Dr. Mills.

In January, 1904, the patient had occasional attacks of vertigo, and sometimes staggered while walking. These attacks gradually grew more frequent and increased in severity. About six months later she began to complain of severe occipital headache, failing vision, and impairment of hearing. There was no nausea or vomiting.

A constant coarse tremor of the head is present when sitting or standing but is more marked when sitting. The patient can stand

for barely a minute with the eyes closed, and tends to fall backward. She walks with difficulty and only with support. The gait is ataxic.

The muscles innervated by the seventh and the motor branch of the fifth nerves on the left side were weak. Sensation was preserved on both sides of the face. There was complete nerve deafness on the left side.

There were nystagmoid movements of both eyeballs when the vision was directed toward either side, but the nystagmus was more marked when looking toward the right side. The left external rectus muscle was paretic.

The upper and lower extremities were ataxic. The patellar tendon reflex was exaggerated on the right side, but was normal on the left. Patellar clonus was distinct in the right side but the Babinski sign was doubtful on this side.

The patient died, and on autopsy a large fibroma was found in the left cerebellopontine angle, pressing upon the pons, medulla oblongata, and cerebellum. The Gasserian ganglion had escaped.

CASE 5.—(Laboratory No. 205.) *Cerebellopontine Tumor.*

Symptoms.—*Ataxia, headache, muscular spasticity, mental confusion, choked disc.*

Mrs. S., aged forty-eight years, was admitted to hospital December, 1903.

In December, 1902, the patient noticed that her limbs began to grow stiff, and since then this stiffness has gradually increased, so that she is unable to walk without assistance. Her husband states that he had noticed a tendency toward mental confusion. For nearly a year she has complained of severe headache and of great difficulty in controlling the bladder and rectum.

Examination.—The patient's mentality is greatly impaired. She answers questions but slowly, and often incorrectly. The memory and judgment are poor.

There is no paralysis of the ocular muscles. Ophthalmoscopic examination revealed double choked disc and the presence of many hemorrhages.

She lies with her thighs flexed on the abdomen, and the legs flexed on the thighs. The right foot is edematous. She does not extend the legs on command, nor can they be extended on the thighs beyond a right angle, passively, because of contractures. No patellar reflex obtained on either side, possibly because of the contractures. Achilles tendon reflex present on each side, but restricted because of contractures. Slight talipes equinus present on each side. The Babinski reflex was not positive on either side.

Tactile sensation cannot be determined because of mental dullness. A pinprick in either leg causes discomfort, but several pricks may be made before much pain is manifested. There is incontinence of urine and of feces. The lower limbs are not distinctly wasted.

Autopsy revealed a fibroma about the size of a pigeon's egg in the left cerebellopontine angle, pressing upon the left side of the

medulla, but chiefly upon the cerebellum; the pons suffered least of all.

CASE 6.—(Laboratory No. 296.) *Cerebellopontine Tumor.*

Symptoms.—*Persistent and severe headache, choked disc greater on the left side; paresis of the left external rectus; slight paresis of the left side of face; lost patellar and Achilles tendon reflexes. Three attacks of unconsciousness, the first with convulsions, the character of which cannot be determined. A remarkable feature is the absence of the ataxic gait.*

Mrs. I. Dean, aged thirty-four years.

Had severe fall on the ice some years ago, striking the back of her head. Present trouble began in November, 1904, during a pregnancy which culminated in the birth of a child March 21, 1905. At this time she noticed that the vision of the left eye was becoming blurred and dim. This symptom became more marked until nine days after the birth of the child, that is, March 30, when she had a severe convulsion; she states that "she worked in a spasm" for several minutes, but was unconscious and stuporous for two days. She also bit her tongue. Since that time she has had most persistent and severe headache, passing across the eyes and in the back of the neck and at the occiput. She has had two subsequent attacks of unconsciousness since this first attack, but, so far as she knows, convulsions have not occurred. During these attacks she has been unconscious for nearly a day. The last attack occurred about two weeks ago. She states that for about a month there has been slight dimness of vision in the right eye. Since her confinement on March 21 she has tried to walk on several occasions but each time she fainted and fell; she is unable to state whether in any particular direction. Her chief complaint at present is of headache and weakness, with dimness of vision affecting particularly the left eye.

She wrinkles her forehead but the wrinkles on the left side are not quite so deep as those on the right, and the left eyelids can be separated by the examiner more easily than the right. She does not seem to be able to draw up the left corner of the mouth as well as the right, though when she shows her teeth, she draws them both up equally well. The tongue is protruded in a straight line, is not atrophied and does not show fibrillary tremors.

The left external rectus muscle is not completely paralyzed. The movement of the right eyeball inward is normal. There does not seem to be any palsy of the other extraocular muscles. The *conjunctival reflex is prompt in each eye.*

Hearing tested by voice seems to be normal in each ear.

Sensations for touch and pain are normal in the face.

Voluntary movements of the upper limbs are normal.

The biceps and triceps tendon reflex and the wrist reflexes are not distinct on either side. The grasp of each hand is good. The finger-to-nose test is good on each side. There is no ataxia.

The sensations for touch and pain are normal in the upper limbs. There is no muscular wasting.

The voluntary power in the lower limbs is normal. The heel-to-knee test is normal.

The patellar tendon reflex is absent on each side, even with reinforcement.

The Achilles tendon reflex is absent on each side. The Babinski reflex is not distinct on either side.

The sensations for touch and pain in the lower limbs are normal.

Hemiasynergy is not present on either side.

The gait is fairly good. She does not stagger, and stands well with the eyes closed and the feet together.

The patellar tendon reflexes, tested for when she was sitting on the edge of the bed, were not obtained until reinforcement was used, when a very feeble reflex resulted on the left side, the reflex on the right side being indistinct.

The sense of position and stereognostic perception are normal in each hand.

A large endotheliomatous tumor was found in the left cerebello-pontine angle. The bone in the middle cerebral fossa was also involved in the growth, though probably not deeply. The tumor pressed upon the pons, medulla, and cerebellum.

CASE 7.—(Laboratory No. 558.) *Cerebellopontine Tumor.*

Symptoms.—*Nausea, vertigo, headache, pain in the right side of the face, tinnitus and deafness in the right ear, ataxia when standing, and failing vision.*

S. Warren, female, aged thirty-three years.

She had had severe headache for thirteen months. Nausea and vomiting were occasionally present, and her condition grew much worse since an operation for retroflexion of the uterus was performed three weeks previously. The pain in the head was almost unbearable; it was of a burning character, and felt as though there were internal pressure. This pain was distinctly more intense on the left side, although it extended at times to the right side. Tinnitus, that sounded like escaping air, was heard in the right ear, and the hearing in this ear was much impaired. It appeared to be impaired also in the left ear. Pain had been felt frequently on the right side of the face. Vertigo occurred at times.

The patellar reflexes were exaggerated. The patient was ataxic on standing and walking, the ataxia being increased on closing the eyes. Slight nystagmus was present on looking to the right.

Dr. B. A. Randall reported, December 23: "There is defect of hearing on the right side of moderate degree only for all tones, more marked for the weaker high or low tones. This corresponds with a lesion of the acoustic nerve, but in contradiction she claims transmission through the bone to the affected right ear."

Dr. Langdon, in Dr. deSchweinitz's clinic, on December 23, 1910, found three diopters of swelling of the optic disc in each eye, and numerous hemorrhages on and near the discs. On December 27, he found that the papillo-edema had increased until the apex of each disc measured $5\frac{1}{2}$ diopters. In addition, several fresh hemorrhages appeared.

The reflex of the right scleral conjunctiva and, to a less extent, of the right cornea, was diminished. Diadochokinesis was good in each hand. Finger-to-nose test showed slight ataxia only on the right side. Asynergia was moderate. When the patient was told to bend the head and body backward, at first, she was not inclined to flex the knees and nearly fell backward. When told to lift the upper part of the body, with the upper limbs folded across the chest, she was at first unable to do so, as she raised the lower limbs from the bed instead of pressing them against the mattress.

The most serious symptoms were nausea, vertigo, headache (more marked on the left side), pain at times in the right side of the face, which was with difficulty to be distinguished from the headache, as it was not present at the time of examination; diminution in the right conjunctival and corneal reflexes; tinnitus and deafness, probably of nerve origin, in the right ear; rapidly developing papillo-edema, with numerous hemorrhages; ataxia on standing and walking; exaggeration of the tendon reflexes of the lower limbs, which varied in intensity from one examination to another; ataxia in the finger-to-nose test, and a moderate amount of asynergia.

A large opening was made over the occipital region by Dr. C. H. Frazier, and the dura was slit. A large quantity of cerebrospinal fluid escaped. It was deemed advisable to perform the operation in two stages, but the patient did not rally sufficiently to justify any further surgical procedure, and died within a few days.

A tumor measuring 4 cm. anteroposteriorly by 2.5 cm. laterally was found in the right cerebellopontine angle. It was well defined and nodular, and did not infiltrate the brain anywhere. It displaced the cerebellum to a point almost at a right angle to the brain-stem. The left lateral lobe of the cerebellum indented the pons. The right trigeminal nerve was attached to the tumor at its periphery, but was not involved within the growth. A bundle of nerve-fibers, having their origin in the acoustic nerve, entered the tumor and became lost within it. It was impossible to determine without dissection whether this was the acoustic or the facial nerve or both, but no trace of any other nerve that could be either of these was found. The tumor pressed upon the right side of the medulla oblongata and flattened this side, and may have stretched the glossopharyngeal and vagus nerves. The pressure of the tumor upon the pons and medulla oblongata had not caused any distension of the lateral or of the third ventricle. The growth was a fibrosarcoma. Mallory regards these tumors as endotheliomata.

CASE 8.—Endothelioma removed from the posterior surface of the petrous portion of the temporal bone.

Symptoms.—Twitching of the right facial muscles, followed by paralysis, auditory hallucinations, followed by deafness on the right side, ataxia, choked disc, headache, nausea and vomiting, impairment of taste.

O. B., male, aged twenty-four years.

Patient was admitted to the University Hospital under the care of Dr. Spiller December 18, 1908, complaining of twitching of the muscles of the right side of the face. The patient had been healthy until October, 1908, when he first began to have attacks of twitching of the facial muscles on the right side. These attacks continued at intervals during a few months and were followed by subacute neuralgic pain about the right ear. At the same time he complained of a feeling as if the external auditory meatus on the right side were plugged with cotton. Two weeks later, on October 15, he first noticed that he could not taste so well upon the right side of his tongue as upon the left, and that while walking there was a tendency to stagger toward the left side. This condition continued and gradually grew more severe. Nothing further was noticed until January, 1909, when sounds like whistling or roaring in the right ear appeared. He compared the sound to that of escaping steam. He stated that the roaring and buzzing in the right ear were increased on lying on the right side. At this time the attacks of twitching of the facial muscles had ceased but not until the right side of the face had become totally paralyzed. The muscles of the upper and lower distribution of the seventh nerve were equally affected. Nausea and vomiting occasionally occurred. A few days later he had a sensation of being whirled from the left to the right side, and on turning quickly with the eyes closed he would fall. Deafness was gradually growing more and more marked and headache, nausea, and vomiting were becoming more severe.

In February, 1909, Dr. Frazier operated, exposing the cerebello-pontine angle. A tumor the size of a small hen's egg was removed, the growth seemed to be adherent to the posterior surface of the petrous portion of the temporal bone on the right side. Microscopic examination showed it to be an endothelioma. The patient died four days later.

There had been no pain in the face, and all forms of sensation were preserved. The fifth nerve was not affected. The masseter muscles on each side acted normally; there was no deviation of the tongue, no weakness of the extremities, no Babinski sign, and no clonus, but the patellar tendon reflexes were somewhat exaggerated, though equal. Sensation in the trunk and extremities was normal. Nerve deafness had been reported by Dr. Randall. Dr. deSchweinitz found double choked disc, but this did not appear until January, 1909; no ocular palsies were present.

CASE 9.—(Laboratory No. 503.) *Endothelioma removed from the posterior surface of the petrous portion of the temporal bone.*

Symptoms.—Nausea, vomiting, impairment of vision, choked disc, right-sided deafness, anesthesia of the right side of face.

F....., aged 28. In service of Dr. Spiller.

In 1905 the patient began to experience sudden attacks of blindness and a feeling of fullness in the head, such as follows the taking of nitrates. There were frequent nausea and occasional vomiting. Consciousness was never disturbed, nor were there any evidences of muscular twitchings. During the following few months he became

partially deaf in the right ear. On December 1, 1908, the right side of his face became numb and the symptom increased in severity, although he never had any pain. The feeling of numbness was sharply limited to the fifth nerve distribution. He did not complain of numbness in the mouth, but the inner side of both lips and of the right upper and lower lips felt numb when touched with the tongue. Sensory examination at this time showed that a pinprick was not felt so well on the right side as on the left, but that the sense of pain was not lost. The patient described it as feeling numb. The other forms of sensation were preserved. Sensory disturbances were more subjective than objective. The masseter and temporal muscles were not affected. The soft palate, larynx, pharynx, and tongue were normal. He has never had any ringing in the ears, but partial nerve deafness was present. In June, 1909, the sensation for pain was lost. The sensation for light touch was distinctly impaired throughout the fifth nerve distribution on the right side. Further examination showed nothing abnormal at that time. In September, 1909, the ophthalmologic examination showed beginning choked disc. The patellar tendon reflexes were weak, but equal on both sides; the Babinski sign was absent.

In November, 1909, Dr. Frazier operated, exposing the cerebellopontine angle. A moderately soft tumor about the size of a hickory-nut was removed. The growth seemed to originate in the posterior aspect of the petrous portion of the temporal bone on the right side. It was almost entirely surrounded by cerebellar tissue, but did not infiltrate it. Microscopic examination showed the growth to be an endothelioma.

REFERENCES

1. Henschen. *Klinische u. Anatomische Studien*, Jena, 1910, p. 225.
2. Dana and Elsberg. *Medical Record*, 1914, lxxxviii, p. 1050.
3. Jumentie. *Rev. Neurol.*, 1913, xxvi (2), p. 474.
4. Hellsten. *Deutsche. Zeit. f. Nervenheil.*, 1914, lii, p. 290.
5. Lneke. *Cleveland Medical Journal*, 1913, xii, p. 325.
6. Marx. *Mitt. a. d. Grenzgeb. Med. u. Chirurg.*, 1913, xxvii, p. 117.
7. Pallasse. *Lyon Méd.*, 1913, xx, p. 285.
8. Yeasey. *Ophthal. Record*, 1913, xxii, p. 138.
9. Kocher. *Correspond. Bl. f. Schweizer Aerzte*, 1912, xlii, p. 421.
10. Berstein and Nowicki. *Monatsschr. f. Ohrenheil.*, 1913, xlvii, p. 415.
11. Geerts. *Jour. de Neurol.*, 1912, xvii, p. 400.
12. Weygandt. *Monatsschr. f. Psych. u. Neurol.*, 1912, xxxi, p. 305.
13. Lindner. *Muench. med. Wochenschr.*, 1913, xxvi, p. 238.
14. Rhese. *Beitr. z. Anat. d. Ohres, d. Nase u. d. Halses*, 1913-14, vii, p. 262.
15. Korn. *Neurol. Centrallbl.*, 1912, xxi, p. 1537.
16. Spiller. *Jour. A. M. M.*, February 19, 1910, p. 570.
17. Weisenburg. *Jour. A. M. A.*, Vol. 1, 1908, p. 125.
18. Cushing. (*Amer. Neur. Assoc.*, May 8, 1910.)
19. Moniz. *N. Iconog. de la Salpêtrière*, 1912, xxv, p. 147.
20. Zange. *Virchow's Arch.*, 1912, ccviii, p. 297.
21. Fraenkel and Hunt. *Medical Record*, December 23, 1903.
22. Spiller. *Univ. of Penna. Reports, Dept. Neurol.*, 1908, p. 400.
23. Weisenberg. *Journal American Med. Assoc.*, May 14, 1910.
24. Plummer and New. *Journal American Med. Assoc.*, April 4, 1914.
- Oppenheim. *Neurol. Centrallblatt*, 1914, April, No. 7, p. 422.
- Milian et Shulman. *L'Encephale*, 1913, viii (2), p. 193.
- Hunt, J. R. *JOURNAL NERVOUS AND MENTAL DISEASE*, February, 1907.

WHAT DO PSYCHIATRISTS MEAN?

BY AUGUSTA F. BRONNER, PH.D.

ASSISTANT DIRECTOR, JUVENILE PSYCHOPATHIC INSTITUTE, CHICAGO

What do psychiatrists mean by their use of the terms "mental defective," "feeble-minded," "idiot," "imbecile?" What is their understanding of the distinction between terms referring to feeble-mindedness in its various degrees and terms referring to psychoses? What is their conception of the difference between the mental conditions characteristic of "Amentia" as distinguished from "Dementia?"

There is no knowing, judging by their diagnoses in a number of cases we have seen—or perhaps more properly, from the terminology in which the diagnoses are expressed. The terms "idiot," "imbecile," "mental defective," seem to mean anything and everything, even as used by well-known men, both in and out of good institutions.

By way of illustration, we cite a few of the numerous cases we know from actual experience:

CASE I.—Statement of a prominent psychiatrist concerning John B., 15½ years old:

"Mental examination: Stigmata of degeneracy in shape of ears; two sides of face different sizes, etc. Is depressed. Judgment of right and wrong poor. Diagnosis: high-grade imbecile."

This case was studied thoroughly in our institute, twice at intervals before and once after the psychiatrist's examination. The boy had been in the eighth grade, public school, and was able to do fairly good school work: he did long division correctly, handled fractions very well; wrote fairly difficult sentences from dictation; read a sixth grade passage fluently. He passed all the Binet tests through twelve years except the third of the twelve-year tests, which involves control of the association processes. He solved many types of performance tests very well; he failed absolutely, however, on such tests as required mental control. He gave evidence of peculiarities in association processes and showed extremely poor apperceptive ability.

In other words, we had very complete and definite evidence that this boy was not innately defective; that he could not be considered a feeble-minded boy, not even a moron, much less an imbecile. Equally as clear was it that the boy was suffering from a psychosis.

He showed numerous peculiarities in his mental processes, but no lack of innate ability.

CASE 2.—Nora S., 17½ years old, was seen by us in November, 1915, and previously in December, 1913. Between these two dates she had been in a State Hospital for the Insane. We wrote to this institution asking for their diagnosis and received the following report:

"Our examination indicated that this girl was mentally defective, but the history would indicate that she had shown a period of excitement similar to that of manic depressive attack. Hence, the diagnosis was finally recorded as manic depressive insanity on a markedly defective basis. *The mental defectiveness diagnosis was based on the history that she had always been a stubborn child with a tendency to use bad language and drink liquor.*"

We ourselves had diagnosed the case as one of "aberration and possibly alcoholic psychosis," but as regards mental defect we found that on the basis of tests as well as social reactions the girl had innately good capacity. She had completed the seventh grade in school. She succeeded on a wide range of tests which were fairly difficult. Reading, writing, and arithmetic were done quite well. She passed through the twelve-year Binet tests without difficulty; in fact, gave no evidence of mental subnormality.

CASE 3.—Louis B., 15 years old, had been tested by us at three different periods with a wide range of tests. We found him a difficult case to diagnose and finally concluded that he was a border-line case; that he was suffering from a psychosis, which made it difficult to estimate fairly his native ability, but we were sure that the boy, if defective, was of high grade. He had reached the fifth grade at fourteen years; was able to do long division, to write a simple sentence from dictation, and to read a fifth grade passage. Graded by Binet he ranked as above ten years of age mentally. His test reactions presented many peculiarities and on the whole were quite irregular.

This boy was sent to a State Hospital for the Insane from which the following report was received:

"The results of our examination and observation show that he is suffering from defective mental development, probably of the *idiot type*. However, his defect is *not a very profound one*, and I believe he could possibly be educated to a greater extent than he is at present."

The point in this instance is not so much whether the boy is a defective, but we would call attention to the contradiction implied

in the statements that he is a defective of the "idiot type," but that his defect "is not a very profound one" and that he is further educable.

CASE 4.—Mary T., 16 years old, came to our laboratory bringing a letter from a physician who, having recently examined the girl, stated "she is a *high-grade idiot* in the pre-dementia state." He recommended that she be sent to the State Institution for the Feeble-minded.

We found that in spite of being of foreign extraction, of speaking a foreign language at home and attendance largely at schools where a foreign language was spoken, this girl very readily graded through twelve years on the Binet tests; indeed, she passed successfully three of the fifteen-year group. She could read and write fairly well and handled simple combinations of number work. We had thus conclusive proof that this girl graded as normal in innate ability.

These cases will suffice to show the present state of affairs. The inaccurate use of terms here indicated causes only confusion to others who try to interpret the findings, and is difficult to understand if the facts themselves are clear in the diagnosticians' minds. The social issues involved from the standpoint of treatment and education are too serious to permit such errors to pass unchallenged. That the social aspects are not always properly appreciated, we have had reason to know.

What is one to think of the physician who assumes his duty so lightly that he is willing to pronounce a boy feeble-minded without ever having seen the lad, basing his verdict on a family history and examination of other members of the family? Yet we know this was done by a well-known psychiatrist when much depended upon the diagnosis. Indeed, the lad's whole future was at stake, for it meant the possibility of committing the boy to the State Institution for the Feeble-minded. Perhaps it is this same method of determining mentality according to one's convictions rather than by study of the individual that has led to the commitment of some normal prostitutes to state institutions for the feeble-minded, since there are those who believe that in almost all cases the offense is due to the fact that the women so engaged are mental defectives.

To revert to our first question—what do psychiatrists mean by their use of terms in reference to feeble-mindedness? It is difficult to find an adequate answer to our query. Yet the difference between defects which are innate, "Amentia," and "Dementia," which develops on what was at once time a normal mentality, should be

perfectly clear. The definitions of the general terms "mental defective" and "feeble-minded," and the terms used to indicate degrees of defect, namely, "moron," "imbecile," and "idiot," have been definitely and clearly given by the British Royal Commission and by the American Association for the Study of the Feeble-minded. There is, therefore, no possible justification for the misuse of these terms or the confounding of "mental defect" with "psychosis."

Is it not time that every physician who undertakes the diagnosis of mentality felt it his duty to know something of general and applied psychology? Ought he not to be familiar with and use properly terms which have such very definite, established meanings? The question of mental testing in order to determine whether or not an individual is feeble-minded, we cannot here enter into—that is another and no less important story.

Now that physicians are more and more frequently consulted by courts regarding mental diagnosis and the disposition of court cases is influenced thereby, the matter becomes all the more serious. The need for clarifying, for the law, the meaning of terms referring to mental conditions is well known. Up to the present time the law has not availed itself of the increased knowledge in the field of mental diagnosis and has not taken cognizance in any way of the grades of mental defectiveness and the terms used to indicate this. Nor is one helped by consulting dictionaries in regard to the meaning of such words as "idiocy," for technical distinctions are not properly made there any more than in law books. It is, therefore, necessary that mental experts shall not only be clearly conscious of the problems and the terminology in this field, but that they shall aid in making these distinctions evident in their relationship to legal procedure. They must themselves make the distinctions which are fundamental; otherwise they will only cause confusion to be worse confounded.

THE COOPERATION OF PSYCHOLOGIST AND PHYSICIAN

BY CLARA SCHMITT, PH.D.

DEPARTMENT OF CHILD STUDY, CHICAGO

In the last few years much attention has been directed toward finding ways of helping the child who is atypical from educational and social standpoints. For this purpose clinics and child study departments are being rapidly established for the purpose of analyzing and helping the defective, the delinquent, and in one or two places, the super-normal child.

The technique for this work is still in the making, though much has been or is being worked out by those interested in the application of psychology in the study of social conduct. The following report of cases is made for the purpose of showing how the practical child study psychologist may be of value to the physician in the diagnosis and educational care of certain types who seek medical advice. The parents of atypical children have always consulted the physician, but he can help them further than his medical knowledge permits only in so far as he is an educator and psychologist. It is not necessary to say, on the other hand, that the psychologist is often at a loss without the help of the physician.

The cases which are here reported are part of a work undertaken by myself and the late Dr. D'Orsay Hecht. The first intention of the work was to make type classifications from the medical and psychological standpoints jointly of atypical child cases seeking medical advice. The untimely death of Dr. Hecht has stopped this work in its broader aspects, but the preliminary report which had been previously agreed upon is partly embodied in this paper. Each case reported falls readily into a class which has come to be rather definitely defined in my own experience.

In approaching a problem case of the kind which may be referred to a child study specialist as distinguished from the neurologist, certain factors which singly or in combination may be the exciting cause of atypical reaction to educational or other phases of social life should be kept in mind.

First, the child may be possessed of some degree of mental de-

fectiveness. The high-grade types of mental defect often go unrecognized by family and teachers. Such was the case with Case 2 described below.

Second, the child may be suffering from certain physical defects such as poor vision, poor hearing, adenoidic growths, poor nutrition, nervous disturbances, etc. Sensory defects go unrecognized often for long periods. The child who possesses them does not receive the same stimuli as the normal child and therefore reacts in a different way than is usual or normal with consequent disapproval on the part of those about him.

Third, the child may have acquired a special set of interests and in his devotion to them makes no effort to carry out other requirements of conventional social life.

Fourth, the cause of atypical reaction may be due to certain factors of personality, the positive causes of which in turn one may or may not be able to determine. There are children so unresponsive in disposition that they make little or no effort to respond to the demands of the teacher and certain ones of the home though they are mentally capable of doing so. Under this head may also be included those cases of great diffidence with which there is a desire to respond but accompanied by lack of confidence in one's ability to respond correctly and consequent lack of initiative.

In the accomplishment of the first part of our task, determining the mental ability, one may keep in mind the following general considerations: The extent of the acquisition and use of language; the acquisition of abstract conceptions such as color, number, etc., and the normal ages of such acquisitions; the ability to gain certain tools for mental expression such as the processes of reading, writing and arithmetic; and finally the ability to use such tools in thinking ways—in short, reasoning ability. Since the material for the reasoning process is knowledge, use may be made of whatever knowledge one finds the child possessed of to test his ability to reason by stimulating him to combine his knowledge items into new forms. Necessarily, then, the methods of examination must differ for individuals of different age and social and educational opportunities for gaining knowledge. The descriptions of the cases here reported show how advantage was taken of the individual interests and mental acquisitions of the patients to determine thinking or reasoning ability. The person who is markedly lacking in such ability can cooperate successfully in normal social life to only a very limited extent. If his limitations are not understood by those about him and allowances made for them much harm may result.

With this short account of the principles underlying successful analysis of atypical social reactions other than those of the insane, we may proceed to describe their application to the following cases.

CASE I. B. N. was a little girl of nine when first seen by Dr. Hecht and myself in March, 1913. The following account of the immediate occasion for the calling in of the doctor is taken almost verbatim from his record. For the two days previous the patient at irregular intervals and without provocation had forced the index finger of one or the other hand well back into the pharynx with enough force and depth of penetration to cause suffocative symptoms and apparent brutality to the throat. This had been oft repeated during the last twenty-four hours, causing fear and panic in the parents, who removed the finger to prevent apparent asphyxia. While the child was being examined in a sitting posture, it made the finger penetration in the throat as though unable to resist the obsession, at the same time with what was very apparent, a pelvic rocking and thigh friction movement of masturbation variety accompanied also by a hand movement which could be construed as scratching of left inguinal region. The nurse stated that when at the stool, the child would rub her genitalia. The mother had never observed anything which would lead one to suspect masturbation. The mother is a very intelligent woman and the child had always been home treated and controlled. A week before the gagging episode a younger child had had tonsils removed. The patient had heard much talk about this. The parents were much concerned about this child, who, being always very healthy, had had much less attention in the home circle than the patient.

Physically this patient presented a frail appearance though about normal in height and weight. The gait was spastic-ataxic, that of a diplegia. There were choreatic movements of both hands. There was a cerebral diplegia, a generalized mild rigidity but more in the legs. The vasomotor trophic system was a little but not much impaired. The sensory system was normal. Superficial reflexes were all exaggerated. A Babinski reaction was obtained on the right, but uncertain on the left. There was a slight drooping of the upper eyelids. The reaction of the pupils to light and accommodation was somewhat sluggish. There was a tongue tremor of choreiform character and a slight speech defect accompanying this. Abdominal reflexes present. In all other respects the child was normal. Dr. Hecht advised that the child be carefully observed for masturbatory practices; that a mental examination be made to determine ability and possibilities of education; and that the child be put through a system of training and control. It was my good fortune to have the child referred to me for the carrying out of these recommendations.

I found in B. a very nervous, though bright and animated-appearing little girl. Except for the rigidity of the limbs, the slight speech defect, and the somewhat husky voice she was not especially abnormal or displeasing in appearance. Emotionally she was very unstable, laughing and crying easily. She was exceedingly affection-

ate, though this did not take the form of caresses. She was very anxious to please everybody about her. Because of her physical frailties she had all her life been the center of concern in the family life. Many medical specialists had been consulted and the family were keeping up the policy of consulting every specialist from whom they had any reason to hope for help. The one other child, three years of age, had up to this time been healthy and had never been of special concern to the parents. The mother had given up almost her entire time to the care, amusement and education of our patient. Though the younger one shared normally in the family life, when a new tutor or nurse was engaged or any other enterprise was considered, it was always with reference to the needs of B. who was always quite conscious of this. I found that though she was very considerate of the happiness of those about her she became uneasy if for more than a short period of time, she was not the center of the stage. At one time when I was there for the purpose of conferring with the mother about a school for her, the talk strayed somewhat from the immediate subject and she brought us back by saying, "Now Mamma let's talk about me." Though obedience was compelled by the mother in essential matters such obedience as entailed self-control upon the part of the child was very difficult to obtain. For example, during our conference she was told to remain out of the room. She went but would return every few minutes to claim attention.

Those elements of the child's history which concern us now were clearly recounted by the mother. She had tried to enter B. in various private schools in the city and had been refused because of her physical condition. One principal said in the child's hearing, "I could not think of having so nervous a child in my school. It would have a bad effect upon the other children." B. was very anxious to go to school and had many fits of crying at being denied. She could not join in games with other children, and would come crying to her mother and say, "Oh, why am I different from other children?"

The mother was concerned with what she feared were immoral tendencies on the part of B. At table she would at times wantonly knock over the glass of water near her; she would deface walls by tearing off the paper; she would at times preface such activities by saying, "Mamma, I'm going to do this just for pure devilment."

In the account of the process of arriving at the type of diagnosis for which I was employed, I shall notice first the very abnormal phenomenon of the finger insertion in the throat. The theory that Dr. Hecht advanced was of a possible masturbatory complex. However, before I saw the child the mother and nurse had talked to her about this matter with the usual show of feeling accompanying the idea of masturbation, and I could, therefore, get nothing from the child but tears and protestations and promises of future good behavior whenever the subject was approached with sufficient definiteness to make sure of any conclusion. It is my opinion, since observing the outcome of this case, that if a mas-

turbatory complex existed it was not set off in the child's consciousness in such form as to respond to introspectional analysis, and that it was not the cause of her action. A second theory arose with the mother's account of the child's sex knowledge. B. had discovered the relation existing between nausea and pregnancy and remarked upon an occasion of illness of the mother that mamma was vomiting and would now have a baby. It was considered that B. may have thought it possible to produce pregnancy in herself by vomiting, but this as a cause had to be given up upon further investigation.

In my opinion, the most probable reason for the child's action lay in her rather extreme egotism. The young sister at this time was ill with a throat operation and was usurping the place in the family life always held heretofore by B. The operation had been much talked of and much concern expressed for the little sister. B. was temporarily forgotten. The injury to her own throat was the final result of the child's extreme desire to occupy the attention of the parents. By this I do not mean that the occurrence was consciously planned to that end, or if it was that the steps between the motive idea and its attainment were retained in the consciousness of the child. This point need not be elaborated to the student of abnormal psychology. It is sufficient to say that after this period the act was never repeated. A fuller training and more satisfactory social life were soon instituted for B. and much of her egocentrism disappeared.

On the mental side this child had given various observers the impression of a measure of defectiveness. This was perhaps due to the fact that the poor motor control prevented her from undertaking the normal child's usual activities. She could do little with her hands, and could not join in games pursued by children of her age. Concerning her mental abilities, I quote from the report made to Dr. Hecht after my examination. In this report only those tests are described as most adequately exhibited the child's mentality.

"Reporting upon the psychological examination of B. N. beg to say that I find her in all respects as regards innate mental ability quite in agreement with the average child of her age. She shows learning ability of the sort usual to her age and the ability to work over the content of things already learned into new forms. These abilities are shown as follows:

"She has learned to read and possesses this accomplishment to about the extent of the child of the second grade in school. She has gained a knowledge of phonetic values, so that she can work out the pronunciation of unfamiliar words for herself. She can hear a story read of at least three pages in length, and of rather a complex nature and reproduce it orally in a few words, with the essential items of the story retained and the nonessential ones omitted. These last two mentioned abilities in connection with reading, defective children of her age do not possess.

"She has been taught simple addition number combinations. She can make new combinations on the basis of the familiar ones without having to go through the laborious process of counting from

one to the required sum or of having to be taught the new combination outright, as is necessary with the defective child of her age. For example, she did this: I asked her to tell me what was 9 and 6. After a moment of thought she answered correctly. I asked, 'How did you find that out, you did not already know it?' She said, 'I know that 10 and 6 are 16 and 9 and 6 would be 1 less.' She learned quickly the meaning of fractional parts other than $\frac{1}{2}$, which she already knew, and then could find $\frac{1}{4}$, etc., of quantities under 20. She could then work out such problems as: If you had 12 cents and spent $\frac{1}{4}$ of your money how much would you have left? This is perhaps sufficient to show her ability to reason and learn.

"In some respects she shows a rather curious inability. I gave her the first four of the tests described by Healy and Fernald in their monograph on 'Tests for Practical Mental Classification.' These tests involve judgment of spatial relationships. Normal children of her age are able to do the most difficult of these tests with little trial and error, that is, they are able to see the right relation between the pieces to be placed together and make few errors in accomplishing the task. Her work showed no conception of such relationships and her final accomplishment of the task was due to chance. She was able merely to keep the object of her effort in mind and to keep at the task until she had found the right combination through having tried out all possible ones. She learned from her efforts, however, and was able to do the tests a second time immediately after their first accomplishment with much less error, though this learning was not as thorough as that of children of six years who must do the tests at the first attempt in the way that she did. Her performance of these tests was much like that of the defective child of her age, with the exception that the defective child learns the tests less readily.

"I believe this defect in the learning of spatial relationships is due to her defective motor control. She has never gotten a motor idea of small spaces such as control of the finger muscles would enable one to get, and because her hands and fingers have never carried out with any degree of perfection any of her purposes in which that sort of motor control was necessary, she has a sort of mental confusion when doing any thing which requires it.

"Mrs. N. tells me she sometimes shows destructive tendencies, such as tearing paper from the walls or shoving the dishes about at table, etc. I saw nothing of those things while with her. She seems socially responsive and affectionate. The explanation for such apparently immoral tendencies may lie in the fact of her poor motor control which does not permit her carrying out any constructive motor process requiring skill and she then does the thing she can do, which is only to push and shove."

B. was placed in the second grade of a private day school in April. The principal and the teachers were sympathetically and intelligently enlisted in her behalf. The school recommendation was made for the purpose of giving the child a more normal environment, educationally and socially considered, to give her association

with other children, to give her an organized outlet for her very active mind and a more scientifically directed education than was possible for her at home. It may be remarked that the school has been founded for the purpose of making application of the best in professional educational thought. It was hoped that this procedure would remove much of the child's egotism and by giving organized outlets for activity, discourage her hysterical tendencies. These expectations have been abundantly justified by the results.

During the early part of her school life there occurred one incident showing her tendency to abnormal emotional reactions. She became frightened by a death scene in a play given at the daily assembly period and was led out screaming. She steadfastly thereafter refused to go to daily assembly. Her teacher had left off urging her, hoping that in time the fear would be forgotten. She was advised that that probably would not be the case. This incident will be referred to again.

B. was passed to the third grade at the end of the year. She is now in the fifth, but needs more help than the normal child to accomplish the work. She is not capable of as prolonged application as other children and her difficulty with writing makes it hard for her to do school work in the usual way. Her progress during her first year may be best summed up by quoting from a report made after an interview with her third-grade teacher.

"Miss L. says that the little girl is doing brilliantly well in the work of the school. She considers her, intellectually, the most brilliant child she has. She has improved so much in her ability to walk and move about that this year she is given no privileges over the other children in marching, etc. She keeps up with them and needs no looking after. She has had the work in the gymnasium regularly and shows great improvement there.

"In a test with the other children of the room in paper napkin folding, she showed an ability not below that of the average for the room, showing that she is able to use well the larger arm muscles. She has, however, made no improvement in the use of the smaller finger muscles, as is shown in her writing. She has as much difficulty now with her writing as she did at the beginning. Miss L. would like some advice on this point.

"You will recall that we are told about her fear of going to the morning exercises upon our visit to the school last spring. I remember that you told her teacher that this fear would not be forgotten but that it would have to yield to disciplinary treatment. This has proved to be the case. She began school again with that fear of going to morning exercises but after being compelled to go by her teacher, has gotten over it and now goes willingly. Her teacher is planning some special types of hand work for her."

Upon a recent visit, I found the child normally composed and controlled. At her mother's request she left the room quietly and remained away during our interview. The mother says she is much less unstable emotionally, though she is still so to some extent. She is receiving the usual educational training except that fine

types of manual work can not be acquired. To alleviate the difficulty with writing she is being taught to use the typewriter in which she is becoming proficient.

This innately brilliantly endowed child has been saved to a happy life for herself, for her family and possibly in the future to society by a fortunate diagnosis and educational opportunity.

CASE 2. C. D. was a boy of fifteen when seen in December, 1913. The physical and medical aspects of this case were summed up by Dr. Hecht in a report to the psychologist of the institution to which C. was sent a few weeks later. I can do no better than to quote this verbatim:

"By way of a brief résumé I should say that C. is 15 years of age, born of Jewish parents, and at present attending school in the sixth grade. The family history without going into great detail is not good. The paternal grandmother was regarded as mildly insane; an uncle on the paternal side is alcoholic and an aunt is very eccentric. The father and mother, and I should say all of the members of the family, including a brother and two sisters, are all of the neurotic type. On the physical side, the boy is now well grown; he has a sallow, muddy complexion and a facial acne; his hands are flabby, clammy with cold, and show marked sweating amounting to more than moisture, and the vasomotor instability in the extremities amounts to wet hands; there is a slight hypertrichosis on the chin; no axillary growth and an abundant supra-pubic amount of hair; descended testes; large genitals for that age. The thyroid is small but distinctly palpable; the pulse is about 100; the blood pressure is low—95 to 100; the tendon reflexes are brisk but not associated with any definite spasticity. The whole physical picture is reminiscent of polyglandular disorder."

I may add in addition to the hereditary account that the adult members of the family are doing well in professional life. The father and brother are lawyers. The latter completed his college course with honors. The two sisters are teachers.

A complete history of the trouble this boy has given his family and the schools he has attended would fill many pages. He began to show backwardness in acquiring school subjects at the beginning of school life at six years of age. He was reported as uncontrollable and troublesome in the school, annoying especially by much talking, which was senseless in character. He had been tried in several schools, public and private. At the time of my examination he was at home attending a public school, in the sixth grade and with a private tutor who helped him with his lessons every day. The year before he had spent in a private tutorial school designed for troublesome boys. In this school the life was largely out of doors under careful surveillance and here he did fairly well. His family thought him so much improved by it that he was again tried in the home. During the last few months he had, however, become so much more troublesome that help was again sought.

It may be pointed out here that much anguish and shame might have been spared this family had it been possible to obtain a correct diagnosis of C.'s mentality earlier. The attempt was made by

a certain child study expert to examine the boy at ten years of age and by another at twelve. Both reported that the boy would not submit to tests but both thought him not mentally defective, but much spoiled by unwise home management and in need of disciplinary treatment. The parents and schools had regulated their treatment and set their attitude toward the boy in conformity with these opinions when, as will be shown below, he was really a high-grade mental defective.

C.'s offenses at the time of my acquaintance with him included asking friends and strangers for money which he spent on candy and sodas; bothering his sisters and others with caresses and kisses; flying into a passion for the most trifling matters and using abusive language; making a nuisance of himself generally at the drug store in the neighborhood and in the houses of friends. He would leave notes in the rooms of his sisters signed with a fictitious name, asking for a clandestine meeting. One note written to his brother reads, "Dear S. I thought I would write you and tell you something. I have been thought of stealing 45.00 from a Mr. Green. I wish you would be at court Monday, Nov. 30th. I know you don't believe me guilty. I wish you would help me out. Your friend, Joe Jackson."

I found C. a well-developed boy, slouchy in attitude and boorish in manners. His appearance was in marked contrast with that of his brother and sisters, who were alert and cultured. His immediate acquiescence to my examination was gained by the father's mild fiction that I had come from the school to see if he could be helped to pass to a higher grade. He soon became much interested in the tests given him and very compliant and responsive. In conformity with the implied reason for my presence I began his examination with a review of his school work. The results were reported as follows:

The examination was begun by asking C. about his school work. He said he was best in geography. His lesson for the next day was a set of review questions on the work of the previous week in the test. He said he could answer some of the questions and some he could not. It was found that the questions which he could answer were such as could be learned by the method of rote memory—for instance, *Name the South Central States*. Questions or problems for solution which were not capable of being gained by such a method he could not get. One such was, *Trace the route by which beef packed in Kansas City may get to market in New York*. He said of this, "The teacher explained it all, but I didn't understand."

To sum up the conclusion gained from the work in geography he shows a lack of ability to do constructive thinking with facts which have been presented to him, but a fair ability to do the work which requires mechanical memory only.

In arithmetic he shows the same type of mental action as in the geography work. He can do some types of arithmetical processes for which he has learned formulas. He applies these formulas in a perfectly mechanical manner. He solved this problem: *If 5 pencils cost 10 cts. what will 3 pencils cost?* "3 5 of 10 cts., 6 cts."

Then he applied the same formula to a problem of a different sort, getting a very absurd result. He could not be brought, after much discussion of the terms of the new problem, to see the absurdity of his method or result. He said: "I don't know why it's that way, we had some problems like that, I think we worked them that way." He can do the types of problems in division of decimals for which he has learned a formula—his class in school is now working in decimals—but he has no conception of the meaning of a decimal fraction. He does all arithmetic work in a slipshod manner—makes absurd errors in long division, for instance, and can find no errors when told to go over the work and look for them.

He worked on the following problem: *If there are 5 boys in this room and 3 boys in the other room, how many boys will have to be sent from this room to the other room so that there will be the same number of boys in each room?* We discussed it together over and over, but he could not solve it.

His reading is good with respect to pronunciation of words but poor with respect to reproduction or ability to gain ideas through reading. He read the following selection taken from a fifth reader used formerly in some of the Chicago schools. *It was in the spring of the year 1826 when Mr. Amos Bliss, manager and one of the proprietors of the Northern Spectator, might have been seen in the garden behind his house planting potatoes. He heard the gate open behind him and without turning or looking around became dimly conscious of the presence of a boy; but the boys of the country villages go into whosoever garden their wandering fancy impels them, and supposing this boy to be one of his own neighbors, Mr. Bliss continued his work and quickly forgot that he was not alone.* His reproduction was: "It was about a man planting potatoes in the garden and he was conscious of a boy watching—and I forget the rest." Normal children of fourth-grade age and attainments are able to reproduce most of the items of thought in this selection in such language as is essential to clear understanding. His performance was in quantity about one fifth of what can be obtained from the normal ten-year-old child.

With Cross Line Test A $\left(\frac{2\frac{1}{3}}{1} \right)$ of the Healy-Fernald series he failed utterly. It was only after the fifth attempt that he could learn to draw and correctly number the figure from memory—immediately after having looked at the original. This is a typically subnormal reaction.

In performing Test I of the Healy-Fernald series, he made 10 errors with the body of the puzzle and failed to reconstruct the divided triangle. Kindergarten children perform the test with less than 5 errors and accomplish the triangle.

With Test IV of the Healy-Fernald series he failed six times, with the puzzle board placed alternately right side up and upside down, to construct the puzzle, though after each failure he was shown how to place the pieces properly and allowed to do the placing himself. He never could readjust the placing of the pieces to the changed situation when the puzzle board was presented to him

upside down with reference to his immediately previous experience with it. He invariably placed the pieces at the top which came at the top previously, rather than with reference to the opening to be filled. This is a typically subnormal reaction. After four more trials without change of the position of the puzzle board and being told how after each unsuccessful attempt he still could not do the puzzle without error. The normal child of kindergarten age accomplishes the puzzle by the trial and error method and after this learning experience, he is able to do the puzzle upside down without error. That is to say, the kindergarten child is able to readjust a certain learned content to a new situation. The child of ten does the test by the planned method—makes few or no errors.

With the Thorndike *a* test, the marking out of 100 a's in a bit of pied material, the difference between the motor and the perception time was 70 seconds. The difference for the normal child of ten is between 20 and 30 seconds.

With the opposite test of the Healy-Fernald series and given as described in their monograph, he showed a reaction time of 3 to 4 seconds for 11 of the words; of 12 and 13 seconds for two; for two of the stimulus words no response could be gained after such stimulating questions as, *If a noise is not loud then how is it?*; for four others responses were obtained only after such stimulation. The average time for children of six years and over with this test is from 2 to 1 seconds, with an average of not more than two failures at any age.

The above account will serve to show how in reasoning ability, quickness of perception, etc., this boy is of defective type. I had hoped to have another sitting with him to gain further data and his reaction to the Binet series. Though circumstances have made that impossible, I think the data at hand are sufficient to justify the opinion that he is mentally defective.

Some data of observational type go to show that he is unable to meet the requirements of the social situation in which he has been living. When I went to the house I found the family at dinner and joined them at table. C. made no response to the formal introduction to me; he ate hunched over his plate in a noisy and greedy manner. Since the other members of the family are cultured and good mannered, this shows inaptness at adjustment to the requirements of normal social life.

He possesses a very good vocabulary. His use of it serves to cover up to the superficial observer the fact of his mental subnormality.

I wish to add further, because of the history of stubbornness and recalcitrancy which have characterized this case, that I was so fortunate as to find him in a most happy and responsive mood. So far as his own willingness was concerned, as good a reaction to tests was obtained as will ever be possible.

The report of the mental findings in this case go to show that this boy had a mechanical type of learning ability which had received much development through special schools and tutors. He had thereby been enabled to learn to read and write fairly well.

He lived in an environment where good language was used and he had a good use of English. At one point in his examination he said of a test in which he was much interested, "My, I'm becoming enthusiastic about this." It was these qualities in him, probably, which had deceived other observers into thinking that he was of normal mentality, when he really was of the moron grade. The moron is defined by Dr. Goddard as one who can work under supervision at fairly complicated tasks, but is unable to plan. At almost every point in his examination he showed himself with some capacity for learning what could be taught in a mechanical or rote manner, but no ability to think, plan, construct, or organize his own thought processes with reference to the end to be attained.

C. has now been in a good institution for the feeble-minded for nearly two years. The parents have been to visit him and report that he is contented there. A report from the psychological department of the institution declares him of feeble-minded grade and undoubtedly belonging to the environment in which he has been placed.

CASE 3. O. N. was a young man twenty-one years of age when seen by myself in August, 1914. Two years before he had been referred by his family physician to Dr. Hecht. His history was to the effect that for two years before that time he had been gradually getting peculiar. He had become very bashful, shunned company, would ask his mother how old he was and ask the same question the next day, would say he was not responsible; complained of a buzzing in the head; was sent to an aurist but no trouble found; failed in his high school work though previously he had been a good student and up to grade; tried business college for a time and failed; had several positions from which he was discharged for laziness; sat silently around the house a great deal; addicted somewhat to masturbation. He was kept under medical care for a time and then entered the preparatory department of a church college. He had completed two years' work there when I saw him and had to his credit the equivalent of three years of high-school work. He came then to Dr. Hecht to find out if his mind was of sufficient caliber to make it worth while for him to go on and prepare for college. He had a great desire to continue his school work and become a minister but feared that he did not have sufficient mental ability to do so. Dr. Hecht at this time reported of him: "I am prepared to say that he is free from the imputation of having any mental disorder. . . . As concerns the physical side he is in every way up to the mark."

Nothing of the previous history was known to me at the time of my examination. Dr. Hecht introduced him with the explanation that Mr. N. wished some educational guidance.

I found O. a slight, pleasant-appearing young man who might have been taken for eighteen years of age. He was quiet, respectful and unobtrusive in manner but there was no observable bashfulness. He was very frank about what he considered his shortcomings and very eager for helpful advice for overcoming them. In his response to all formal mental tests he was quick and alert. He passed satisfactorily those of the Binet-Simon scale through fifteen

years and the adult list and the most difficult ones of the Healy-Fernald set. He was tested for immediate memory and for persistent memory. He was a reader of good books and could reproduce the substance of them clearly and comprehensively. The results of the examination are summed up in the following report:

"From this boy's account of himself I find that he is troubled with the fear that he is in some ways inferior to other people. I judge that he came for examination in order to get advice as to ways of removing the inferiorities which he believes exist.

"The first of these concerns his physical weakness. He is troubled because he hasn't "much muscle," finds other boys "pretty husky," isn't much good at baseball because he "can't throw a straight ball," has gotten into several scraps with other boys and been worsted.

"The second fear of inferiority concerns the quality of his mind. He is troubled because he can't keep his mind on his studies. He has another worry about the quality of his mind which was a little difficult to analyze. After much discussion and questioning, however, it appears that his mind does not possess a large amount of visual imagery. He says of his reading, "I can't picture it in my mind as other people do." (A teacher of literature had once told him that he should be able to do so. She probably was a *visualizer*.) "Can always get the plot and understand well." He told of reading Robinson Crusoe recently. He said some of it seemed "real," got imagery and emotional reactions, but some seemed unreal: "I couldn't imagine it, I couldn't feel any emotion." He thought too, that there was something wrong with his mind in still another way. He said, "Sometimes I can't feel my mind working, one ought always to be conscious that his mind works, he ought to be able to feel it, the mind weighs four ounces, doesn't it? One ought always to know what it is doing." It seems that his worry is connected with the lack of visual imagery. He thought that the normal mind kept up something like a moving-picture performance.

"His third source of worry concerns an inability to get on well with other people. He says he doesn't get acquainted easily and that he has friction with others. "I'm not sympathetic with others, I can't see anything but my own way, if I want to do one way, and the other boy wants to do some other way, I can't see his way I can't see any but my own. I get along best by myself." He wants to be a minister, however, and realizes that he should be able to get along well with other people.

"His pedagogical account of himself is as follows: He has been in school steadily for two years, but for three years before he was out of school much because of illness. He makes good grades in languages. Did two years of Latin in the last year, has three years' Latin credit, and two years of German. He passed in algebra when many of the class failed. He received a poor grade in biology; he thought it was because he could not do the drawing well, said he could not get in the small details or get right proportion; that when he looked from the microscope to his drawing he could remember only a small part of the object he was to draw. He got better grades

in the drawing lessons because there the model was always before one, he thought.

"Since O. is able to introspect I could give him some association tests. It seems from the free associations gained from a wide range of stimulus words that his associations are sometimes of the visual type, occasionally of the auditory, but for the most part they are of the logical type. The reasons for some of the associations were not apparent. When asked to explain them he disclosed wide complexes of thought gained from his reading. He gave an account of his method of learning his language lessons, which is in conformity with his type of mind. He can learn the vocabulary of each lesson best in connection with the reading text, not by rote memory.

"I gave him a few other tests which show his deficiency in visual imagery, but for the accomplishment of which he is able to substitute other methods. He did the two or three formal reasoning tests well. He worked out quickly an algebra problem involving equations of the second degree, though he had his algebra two years ago. He read several long and difficult passages and reproduced them fully and logically. He reproduced a passage read to him as a memory test, accurately as to thought, but in language of a less simple type than that of the original selection.

"He reads much—novels, poetry, and essays. He seems to have gained much of his ideals of social ethics from Ruskin.

"I have outlined above his feelings of inferiority. He has, however, some mitigating hopes and experiences. He has worked on a farm this summer and says he has developed more muscle. He wants to go out to the Kansas harvest fields with a friend next summer, and thinks that will make him much stronger. He finds that he can learn his lessons more quickly this year than he could last year. I believe that the trouble with his lessons was caused by a lack of control of attention due probably to his previous three years absence from school.

"My diagnosis of this boy is, as may be inferred from the above, that he is mentally normal. His fears about the quality of his mind have arisen from his habit of introspection along with a slight smattering of scientific knowledge, insufficient for correct interpretation. He is quite capable of going through college. It was this point especially upon which he wished advice. I judge that he should devote himself to some line of scientific work, rather than the language and Bible study which now engage his attention. Because of his ideals of social service, I should think social science would be preferable. But of course he will have to work that out later.

"I think his own plan for the coming year is the best that can be devised. He wants to go back to college and live in the "family." The family is a cooperative group. The members perform all the work of the farm, dormitory, kitchen, and dining room. Here he will learn to get on with others, since he will always have to cooperate.

"There are two drawbacks in that institution for a boy of his type. First, it is too religious. This may, however, be counteracted by the very busy life there and the very intensive social life, which

will leave no time for introspection. Second, the living conditions are rather rigorous. The food is, or used to be, poor in quality, cooking and dietetic value. I have known many students to come away from there with depleted health. Since he is not a very strong boy this condition may have its effect upon him. But perhaps good advice as to the physical care of himself may mitigate it.

"I explained to O. the psychological phases of his case. He seemed pleased and satisfied when I told him that the visual type of mind which he coveted perhaps gave its possessor more pleasure, but that the logical type which he possesses is more useful to the rest of the world. I tried to give him a confidence in his own ability. It is possible that he will be socially less reticent if this sort of confidence takes hold upon his mind."

After this report was made some confirmatory material in the shape of letters written some months before by the young man to his mother were given me. These recount minutely and in normal fashion the happenings of his school life; there was recorded his elation over some good grades, and regret over one that had gone as low as 89; his generous admiration for some good speakers whom he had heard, for a few schoolmates he had found charming; and throughout it all his frequently expressed regret that he, himself, did not measure up to the high standards of his admiration. He was, however, sure that in time he would improve. A part of one of these letters may be quoted to show the deprecatory attitude he had toward himself.

"You know lately I feel that I don't care to study so much anymore. It will soon be over with anyway. There are not quite four months remaining of the school term this half and it is all a discouraging thing anyhow. But then it is this way about the lessons, too. If I don't study quite a lot, what else can I do? It will soon be spring and there will be exercise outdoors for anyone and swimming in the pool, if they take the floor out, but there is sure to be lots of time. I don't believe I fully appreciate what it *means* to study, because I don't really have much *mental pleasure* in exercising my mind on those lessons or hardly anything else. The truth of it is, I can't feel my mind exercise itself. My brain is asleep all of the time for all I am aware of any activity going on in it. One of the speakers at chapel mentioned that we feel the effect of the activity of our faculties. Well the grades I get in my studies and the good work I seem to be doing in class may be the *effect* of mental activity but that is the only ground I have to work on for knowing that there is such a thing going on in me. I remember after the K—H—entertainment of musical selections I had quite a feeling in my head, what I call a glow, but that is the best I ever have had this year.

"The people here just consider me a kid, and though I know I do kiddish tricks at times, I don't believe anything I do hurts my mind. I have smoked tobacco on two occasions since I left home last fall. That is the extent of *that* indulgence. I don't think I've hurt myself any other way to any extent. So I hope and trust that some day in the future I will be pleasantly surprised by a conscious

swelling of gray matter in my bean in such a way that I will feel real sensible and begin to have feelings of my own. I am sure then that I will be able to appreciate the minds of other people and guess their minds, and begin to act more like a boy of my years should, and *grow*. I believe firmly, and nobody can deceive me any longer about it (unless they should keep on insisting to the contrary so long), that anybody can appreciate or guess the minds of everybody else, providing they know their own minds, and I insist that that is still more than I know. No wonder I am a stick! I can't like anybody very much, so of course I don't make friends. I haven't a spark of spirit, unless it is animal spirit, and that isn't anything for people to like about me. Why I never feel for a single day like a young man. I believe when I come to know my own mind that then I will wake up and be a person 'and develop rapidly in leaps and bounds' as Mrs. L. R. said I would in her reading of my handwriting a long time ago. They can talk all they want about my being *simple* and they are about right I guess. But when it comes down to saying that I always will be this way, it makes me as sore as I can get. My theory is that I am not near what I will eventually become in time, in ten or twenty more years possibly, and that is my only consolation for being a dead spirit and a stick! As far as what I'm doing goes, well, I do *study*, as far as I know what that means; and no matter what I am, I an't a grouch, either, when it comes to people. If I *ever* come around and get alright you'll know quick enough, and so will anyone that has contact with me in any way."

A letter written some weeks later, however, is much less ego-centric in tone. In it he scarcely mentions himself subjectively but talks much of the admirable people he has seen and heard and told about having declaimed a fine selection, he thought, very well.

CASE 4. J. M. was 13 years of age when seen in September, 1914. A physical examination disclosed nothing positive. She was the fourth and last child of well-to-do Jewish parents. There was no backwardness in walking or talking, but in other ways she appeared less bright than the other children of the family. She began to show her mental defectiveness markedly, however, only after beginning school. She had been tried in public school, with private tutors, and for the last three years in a most excellent private school situated in the country. The principal of the last school had advised the parents not to return her at the beginning of the school year, saying that nothing could be done for her there.

J. was a bright, vivacious-appearing little girl. She was rather small and looked and acted much younger than her years. She was normally responsive and could engage in small talk concerning her own doings, the affairs of the family, etc., with assurance and accuracy. Superficially she gave the impression of the normal nine or ten-year-old child. The mental examination, however, very easily disclosed a quite different condition. The report of the results of the examination was as follows:

"J. passes all the *seven year* of the Binet tests, except that her

counting of 13 objects is rather uncertain. She is likely to skip some of the series because of wavering attention.

"The following is a partial account of her performance with the eight-year tests.

"1. (Tell difference between butterfly and fly; wood and glass.) 'The butterflies are white and the others are yellow.' (Ques.) What are yellow? 'Oh, oh—the— what did you say?' (had forgotten the problem; it was repeated for her). 'The butterflies are yellow and the flies have white, a little bit of white.' 'Oh, wood is a big piece of wood, that you use for fire, and it's all white, and what else did you say?' (Problem repeated.) 'Oh, glass is thick and large and breakable and kind of thick and it's awkward, awful awkward and heavy stuff.'

"2. (Count backward from 20.) Makes no organized effort.

"3. (Repeat days of week.) Correct.

"4. (Count stamps.) Failure.

"5. (Repeat 3, 5, 9, 1, 3.) Correct.

"She failed on all of the nine-year tests except the one for repeating the months of the year. In school work she has gained less than the average seven-year-old child. She can make such combinations as $7 + 8$ and $10 - 6$ by counting marks; she cannot manage a problem involving making change with a dime after making two purchases; she forgets the terms of the problem over and over. She can read less readily than a normal first-grade child.

"She does the Healy mechanical tests with less facility than a child of kindergarten experience and learns them very slowly after instruction. She cannot do the cross-line tests, or the opposites test because of lack of control of attention.

"She chatters much while working. She is vivacious and bright in appearance.

"My diagnosis is that she is feeble minded. She should be given institutional care to prevent social delinquencies."

HOFFMAN'S SIGN OR THE "DIGITAL REFLEX"

BY TEDROW S. KEYSER, A.B., M.D.

NEUROLOGICAL DEPARTMENT, WESTERN RESERVE UNIVERSITY

INTRODUCTION

During a period spent at the Neurological Institute of New York, I was told of a reflex of the fingers which was designated by the term "Hoffman's Sign." Although the phenomenon was present quite frequently in neurological cases, no special attention was given to it until it was learned that, in general, physicians are not familiar with the reflex. The reason for the latter fact was quite evident when a very careful search of the literature for the original article or any reference thereto was entirely unsuccessful.

I desire to acknowledge my appreciation of the assistance of Mr. J. C. Harding, librarian of the Cleveland Medical Library; Dr. Fielding H. Garrison, assistant librarian of the Surgeon's General Library; and the editor of the Journal of the American Medical Association in this investigation.

As a result of the mysticism attached to the original observation and disclosure of this sign, the author assumes the liberty of suggesting the term "Digital reflex" to designate the phenomenon. So far as has been found, this term has not been employed except by A. Souques (6, 7), who, in 1907, described a reflex, under the term "*Phénomène des doigts*," which consists of extension and abduction of the fingers in cases of spastic paralysis when the arm is passively raised. However, this sign has not been generally recognized and is not described in any neurological textbook. Therefore, no confusion apparently would arise from the use of this term for the reflex under consideration.

DESCRIPTION OF THE REFLEX AND MODE OF ELICITATION

The reflex typically consists of a flexion of the terminal phalanx of the thumb and of the second and third phalanges of one or more of the fingers when the operator suddenly nips the nail of the index, middle, or ring finger. The best method to elicit the reflex is as follows: In testing the right side, the patient's hand, in the position

of pronation, is supported by the right hand of the operator. The patient must allow the muscles to relax, in which case the fingers will naturally assume a partially flexed attitude. As in testing for the deep reflexes this relaxation is often obtained most satisfactorily by diverting the attention of the patient. With reference to the thumb, it has been found that it is advantageous for the operator to press the middle finger of his supporting hand lightly against the palmar surface of the proximal phalanx of the patient's thumb, which causes a slight flexion of the distal phalanx.

After obtaining satisfactory relaxation, the operator grasps the end of one of the patient's fingers between his thumb and index finger. The pulp of the finger of operator and patient are in contact, while the edge of the nail of the operator is pressed against the surface of the nail of the patient. While pressing firmly the operator quickly flexes his thumb so that the nail abruptly slips off the nail of the patient. When the reflex is typically present a quick flexion of the terminal phalanx of the thumb and of the last two phalanges of one or more of the fingers occurs. The test, however, is considered to be positive if *definite* flexion of either the thumb or one or more fingers results. The test should be made on all the fingers, for at times it is present for one and not another. The possible reason for this fact will be considered later.

REPORT OF CASES

The number of cases recorded in the accompanying chart has purposely been limited, as it necessarily becomes confusing and tiresome to attempt to read over a mass of statistics. No discrimination has been used in the selection of cases. In fact, they consist of all the patients of a large neurological service in whom there was any evidence of involvement of the motor tracts and also all cases in which the reflex was obtained. It will be noticed that a number of cases with no apparent organic lesion are included in the series.

RÉSUMÉ OF CASES

1. *Cerebral Hemiplegia*.—The type of case in which the value of the reflex is most simply established are those of hemiplegia due to a lesion of the internal capsule as no question arises concerning the involvement of the pyramidal tract above the level of the cervical region. Twelve such cases are included in the series, giving the following results:

No.	Side	Babinski	Oppenheim	Gordon	Hoffman
1	Right	?	No	No	Right
3	Left	Left	Left	No	Left
4	Right	Right	No	No	Right
6	Left	No	No	No	Left
8	Right	Right	No	No	Right
11	Left	Left	No	No	Left
17	Right	Right	No	No	Right
18	Left	Left	Left	Left	Left
19	Left	Left	No	No	Left
22	Left	Constant extension	Do.	Do.	No
27	Left	Left	Left	No	No
30	Right	No	No	No	Right

The reflex is present in ten of the twelve cases. In twenty-two and twenty-seven the paralytic stroke occurred ten and three days respectively before examination. The paralysis of the hands was of the complete flaccid variety, so common in recent hemiplegia when the tendon reflexes are absent or obtained with difficulty. One would not expect to obtain the reflex at this stage of the disease for all reflexes are frequently abolished during the period of "shock" following an apoplectic stroke. However, the sign was obtained in both of these cases a week later. A large number of hemiplegias have been examined and the results in general are the same as shown in this series.

2. *Cerebral Meningo-Vascular Syphilis*.—In this group of cases are included all patients seen in whom the motor symptoms and reflexes indicated involvement of the pyramidal tracts.

No.	Side	Babinski	Oppenheim	Gordon	Hoffman
2	Both	Double	Double	Double	Double
5	Both	?	No	No	Double
7	Both	Double	No	No	Double
13	Both	Double	Double	No	Double
21	Both	Double	No	No	Double
26	Both	Double	Double	Double	Double

No comment is needed in regard to this group in which the reflex was always present. It may be stated that these cases were examined repeatedly and the reflex always obtained.

3. *Miscellaneous*.—In this group of cases are included various organic conditions of the central nervous system.

Lateral sclerosis is a condition in which the lower part of the crossed pyramidal tracts are involved, therefore, the digital reflex is not obtained. The case of sensory aphasia is included because the reflex was obtained on one examination and was absent on sev-

No.	Diagnosis	Babinski	Oppenheim	Gordon	Hoffman
9	Amyotrophic lat. scler.....	Double	Left	Left	Left
10	Cerebral hernia.....	Frank flexion	No	No	Left
12	Multiple sclerosis.....	Right	No	No	Right
14	Lateral sclerosis.....	Double	No	No	No
16	Multiple sclerosis.....	Double	Double	No	Right
20	Sensory aphasia (luetic).....	No	No	No	Variable left
28	Frontal tumor.....	No	Left	Left	Left
34	Paralysis agitans.....	No	No	No	Right
35	Multiple sclerosis	Double	No	No	Double

eral subsequent observations. It has been found that such a result should not be considered as indicating a positive test, for the reflex was practically always obtained on repeated examinations when an organic lesion was present. An indefinite result should be discounted entirely when later no reflex is present. The positive test in the case of paralysis agitans opens up an interesting field of investigation on which I hope to collect further data. Many observers are of the opinion that paralysis agitans is due to a lesion in some part of the extra-pyramidal motor apparatus which includes parts of the cerebellum, the lenticular nucleus, optic thalamus, red nucleus, and various connecting and spinal tracts. The question is whether the reflex will be found to be positive in the very difficult group of cases in which extra-pyramidal tracts are involved.

No.	Diagnosis	Babinski	Oppenheim	Gordon	Hoffman
15	Hypomania.....	No	No	No	Double variable
23	Urinary retention (monosymptomatic tabes).....	No	No	No	Double
24	Jamaica gin habitué.....	No	No	No	Double
25	Post-puerperal psychosis.....	No	No	No	Double
29	Thrombangeitis.....	No	No	No	Double
31	Acute Alcoholism.....	No	No	No	Double variable
32	Psyesthesia.....	No	No	No	Double variable
33	"Conflict Depression".....	No	No	No	Double

4. *Functional Cases.*—Practically all the tests which are employed in clinical examination have certain defects which often lead to great difficulty in diagnosis. We are all familiar with the frequent uncertainty which arises in regard to the presence or absence of the Babinski. On numerous occasions, I have been asked to see patients who are said to have a Babinski and find that the dorsal flexion of the great toe is merely a defense or automatic movement. In many apparently normal individuals the deep reflexes are so active that an organic lesion is often suspected. So, in regard to the digital reflex, it has been found frequently in pa-

tients in whom there is no question whatever of organic disease of the nervous system. The deep reflexes are always "lively" in such cases. So far, no special type of condition has been found in which the sign is present. However, they are usually patients presenting some form of mental disturbance.

After it was learned that the sign occurred frequently in functional conditions, a great many patients in hospital and dispensary practice were examined, with the result that eight such cases were found. From the remarkable diversity of conditions in which it was present, no conclusions can at present be drawn in regard to its possible importance as a means of diagnosis. However, it may be said that certain individuals show evidence of a hyperexcitability of the nervous system which may be an intermediate stage between the normal and tetany. It is hoped that a series of such cases may be tested with the galvanic and faradic currents to determine the degree of electrical excitability.

ANATOMY AND PHYSIOLOGY

The nerves of sensation of the finger tips are distributed as follows: The median nerve supplies the thumb, index, middle, and radial half of the ring finger; the ulnar, the ulnar half of the ring finger and the little finger. However, for our purpose, the segmental innervation is especially important. The various authorities differ somewhat regarding the segmental distribution, but the consensus of opinion is sufficiently accurate for the present consideration. The thumb, index finger, and radial half of the middle finger are innervated from the sixth cervical segment; the ulnar half of the middle finger and the radial half of the ring finger, from the seventh cervical; the ulnar half of the ring finger and the little finger, from the eighth cervical. (After Dejerine.)

The movement which occurs in the reflex consists only of flexion of the fingers and thumb at the interphalangeal joints (rarely of the metacarpo-phalangeal joints). The muscles involved, therefore, are the flexor digitorum sublimis and profundus and the flexor pollicis longus. The flexor digitorum sublimis and the flexor pollicis longus are supplied by the median nerves and the flexor digitorum profundus by the median and ulnar nerves. These muscles are innervated from the sixth, seventh and eighth cervical and first thoracic segments.

From this review of the anatomy, it is found that the sensory nerves which receive the stimuli in the test arise from the same segments of the cord from which the muscles involved in the reflex receive their motor supply.

It is not within the scope of this article to enter into a discussion of the facts which have been brought forward to show that this is a purely segmental reflex activity. A full account of this subject will be found in Luciani's *Physiology* (2). The spinal cord represents a series of central organs (segments) which are intimately connected but nevertheless are more or less unitary in their functions. The predominating function of the myelomers (segments) is a reflex act which is the "involuntary transformation of a centripetal into a centrifugal nerve impulse, by means of a central organ, represented by a group of ganglion cells (3)." The digital reflex, we believe, belongs to this group of most primitive segmental reflexes which includes sneezing, coughing, contraction of pupil to light, etc.

The reflex offers an opportunity for an unusually delicate observation of the phenomena of segmental spinal reflex activity due to the definite localization of the site of stimulation, the abruptness of the stimulus, and the simple motor response produced. It has been found that the extent of motor response varies definitely according to which finger is stimulated. The greatest response is obtained from stimulation of the middle finger. The responses from the index and ring fingers are about equal. Usually no response is obtained from the little finger. The segmental sensory distribution to the fingers offers a very suggestive explanation of this observation. The middle finger receives its sensory supply from two segments, namely the sixth and seventh; therefore, afferent impulses from this finger would be carried to both these segments and naturally would evoke a greater motor contraction. However, the ring finger also receives its sensory supply from two segments, the seventh and eighth, but, gives no greater and often less response than is obtained from stimulation of the index finger. This apparent contradiction is possibly explained by a more accurate consideration of the motor innervation of the flexors of the fingers. The flexor pollicis longus is supplied from the sixth and seventh segments; therefore, as great or greater motor response would be expected on stimulation of the index finger. The flexors digitorum are innervated from the sixth, seventh, and eighth cervical and first thoracic segments. But this innervation corresponds to a certain extent to the sensory distribution, that is, the radial part is supplied mostly from the sixth segment; the middle, from the seventh and eighth; and the ulnar part, to a slight extent, by the first thoracic. As the reflex consists almost entirely of flexion of the thumb and first two fingers it is apparent that the sixth, seventh and, to a slight extent, the eighth cervical segments are involved in the response.

These observations accord entirely with the statement of Sher-

rington (5) on the intraspinal irradiation in short spinal reflexes: "The degree of reflex spinal intimacy between afferent and efferent spinal roots, *i. e.*, the facility with which the reflex is discharged, varies directly as their segmental proximity. Taken, generally, for each afferent root there is in its own segment a reflex motor path of as low resistance as any open to it anywhere. In other words, each single afferent root, or a single filament of it, evokes a special reflex movement with a minimal stimulus."

The question arises why the other muscles of the arm supplied from the same spinal segments do not respond to the afferent stimuli. Sherrington's statement that "the different motor mechanisms for the skeletal musculature lying in the same spinal segment exhibit markedly unequal accessibility to the local afferent impulses," gives us a physiological explanation of this fact. This aspect of the question brings up the question of the phylogenic origin of reflexes which is at present occupying the attention especially of French neurologists. We will not enter into this subject except to say we believe that this special reflex is one of the simplest forms of defense movement of the upper extremity, and that defense movements always consist of flexion, *i. e.*, a movement which removes the extremity from a noxious stimulation.

THE STATUS OF THE DIGITAL REFLEX IN RELATION TO OTHER REFLEXES

1. *The Deep Reflexes.*—The knee-jerk will be taken as the representative of the deep reflexes. Although the true reflex character of the knee-jerk is not entirely admitted, it is known to be dependent upon the integrity of the reflex arc which exists in the fourth and fifth lumbar segments. Thus, we see there is a definite parallelism between the nervous mechanism of the two reflexes; both are examples of a primitive segmental reflex. The physiological distinction will be considered below.

The main clinical distinction between the two phenomena is purely relative; *viz.*, the difference in the threshold of excitability of the reflex arc; or, on the other hand, it may be simply a difference in the amount of afferent excitement afforded by the different forms of stimulation applied. Whichever may be the case, the knee-jerk is practically always present in any normal individual, while an increased excitability of the reflex arc is necessary before the digital reflex is elicited. The occurrence of the reflex is shown from the résumé of the cases given, to occur under two circumstances: First, constantly in organic lesions of the upper motor neurones after the effect of shock has receded; second, in an at present ill-defined state

of hyperexcitability of the nervous system, or, to be more explicit, of the segmental reflex arc. The deep reflexes usually show a definite parallelism to the digital reflex with, however, certain exceptions considered below.

2. *Defense or Automatic Reflexes.*—In recent years, a number of neurologists have written on the subject of the defense reflexes (Babinski, Dejerine, Marie, Pastine).

These phenomena depend on the integrity of the spinal reflex arcs and are true reflexes. That the deep reflexes are different in mechanism from the defense movements is quite apparent from the fact that they may be abolished or decreased in cases where the defense movements are exaggerated (Friedreich's disease, paraplegia in flexion, and cases of complete section of the cord). The deep reflexes depend on the integrity of muscle tone (Luciani 7) which is not simply of segmental reflex origin, but dependent on impulses from higher reflex arcs (extrapyramidal motor apparatus). To Sherrington we owe the conception that various efferent impulses from different levels all act on the common final path to produce normal motor activity. The deep reflexes may be absent when the spinal reflex arc is intact. Defense movements, on the other hand, are dependent apparently simply on the integrity of the spinal reflex arc. However, they, too, are absent during the period of "shock" following an acute cerebral lesion, *i. e.*, cerebral hemorrhage.

The digital reflex appears to belong to the group of defense reflexes for several reasons. The form of stimulation by which it is elicited is similar to that used in producing the defense movements, that is, external stimuli to either the superficial or deep afferent neurones, while the deep reflexes are produced by stimulation of the periprioceptive nerves of the activated muscle itself. Although in most cases examined, the deep reflexes are exaggerated when the digital reflex is present, yet this is not always true. In recent hemiplegias due to hemorrhage in or near the internal capsule, the muscles of the hand and forearm are usually most affected and remain flaccid for a long period after spasticity has developed in the upper arm and lower extremity. The biceps and triceps may be obtained while the radial reflexes are still absent. However, the digital reflex is usually obtained from two to ten days after the onset of the illness, although flaccidity is still complete, the radial reflex absent, and the biceps and triceps greatly diminished. Individuals in whom there is a hyperexcitability of the nervous system evidenced by very active deep reflexes, but no sign of organic lesion, frequently show defense movements of the lower extremities on plantar stimulation, often by an abrupt dorsal flexion of the great toes. It is in such patients that

the digital reflex is present, usually on both sides. From these features of similarity of the digital reflex with the defense movements, it seems warranted to classify it with the defense or automatic reflexes (Marie).

3. *The Toe Phenomenon of Babinski*.—The physiology of the Babinski reflex is still an unsettled question. The fact that it occurs together with other defense movements (Babinski) in young children would indicate that it is primarily a defense reaction. However, in adults, many facts contradict this hypothesis, so that it cannot be classed as a purely defense movement.

Clinically the Babinski differs from the digital reflex in the following features: The Babinski rarely, if ever, is obtained except when there is some organic lesion of the upper motor neurone. It is often absent, indeed there may be a frank flexion of the toes, in lesions of the pyramidal tract (Case No. 38), usually when the lesion is above the corpus striatum. Lesions of the extrapyramidal motor tracts do not lead to the Babinski, while the digital reflex may be present.

The other reflexes (Oppenheim, Gordon and Schaeffer) which have been classed with the toe phenomenon are considered by Babinski to be really defense movements. This conclusion throws considerable light on the frequent discrepancy which is observed in the occurrence of these various reflexes.

SUMMARY

No reference in the literature was found concerning the Hoffman sign. The term "Digital Reflex" is suggested. The phenomenon consists of flexion of the thumb and fingers when the operator suddenly nips the nail of one of the fingers of the patient. The reflex is found to be practically always present in organic lesions of the upper motor neurones except during the period of "shock," and also in some functional cases associated with "lively" deep reflexes. The anatomy shows the afferent nerves stimulated have the same segmental origin as the motor fibers innervating the muscles participating in the reflex. Various facts are recorded to show that the reflex belongs to the group of defense movements in contradistinction to the tendon reflexes.

1. Babinski. *Rev. Neurol., An.* XXII, No. 15, p. 149.
2. Luciani. *Human Physiology* (translation by F. A. Welby). Vol. III, pp 290-341, 1915.
3. *Ibid.*, p. 310.
4. *Ibid.*, p. 326.
5. Sherrington. *Schäfer's Text Book of Physiology*, Vol. II, p. 849, 1900.
6. Souques. *Bull. et mém. Soc. méd. d. hôp. de Paris*, p. 677, June 28, 1907.
7. Souques. *Semaine méd.*, p. 322, 1907.

Age	Diagnosis	Duration	Motor Symptoms	Reflexes	Palinski	Oppenheim	Gordon	Digitai	No.
72	Hemiplegia vascular . . .	3 yrs.	Weakness and moderate spasticity on right	Exaggerated on right	?	No	No	Right	1
45	Isletic cerebro-endarteritis	2 yrs.	General spasticity and weakness. Clonus	All exaggerated	Double	Double	Double	Double	2
75	Hemiplegia vascular . . .	9 mos.	Moderate spasticity and weakness. Ankle clonus on left side	Left > Right	Left	Left	None	Left	3
60	Hemiplegia vascular . . .	1 mo.	Complete paralysis of right arm and leg. No spasticity	Exaggerated on right	Right	No	No	Right	4
49	Cerebrospinal lues	1 yr.	Moderate weakness and spasticity. Double pseudo-clonus	All exaggerated	?	No	No	Double	5
59	Hemiplegia vascular luetic	1½ yrs.	Slight weakness left arm and leg	Left > Right	No	No	No	Left	6
31	Cerebrospinal lues	4 mos.	Moderate spasticity. Double clonus	All exaggerated	Double	No	No	Double	7
65	Hemiplegia vascular stroke	2 yrs.	Marked paralysis on right. Spasticity. Dysarthria. Clonus	Exaggerated on right	Right	No	No	Right	8
36	Amyotrophic lat. scler. . .	5 yrs.	Atrophy of shoulders. Spasticity left forearm and legs. Clonus	Exaggerated except absent biceps-triceps	Double	Left	Left. Doubtful	Left	9
38	Cerebral hernia following injury. Hemiplegia.	14 yrs.	Marked paralysis and spasticity on left	Exaggerated on left. Clonus on left	No (flexion plantar)	No	No	Left	10
69	Hemiplegia vascular stroke	4 mos.	Moderate spasticity on left	Exaggerated on left	Left	No	No	Left	11
31	Multiple sclerosis	6 yrs.	Typical of advanced case	All hyperactive	Right	No	No	Right	12
34	Cerebrospinal lues	4 yrs.	General weakness. Spasticity of legs	All hyperactive	Double	Double	No	Double	13

Age	Diagnosis	Duration	Motor Symptoms	Reflexes	Rabinski	Oppenheim	Gordon	Digital	No.
28	Lateral sclerosis.....	2 yrs.	Spasticity of legs. None of arms. Clonus None	Normal of arms. Exag. of legs All lively	Double	No	No	No	14
30	Hypomania.....	6 mos.			No	No	No	Double variable Right	15
29	Multiple sclerosis.....	5 yrs.	Spasticity of legs. None of arms. Double clonus	Of legs Exag. Of arms Rt > Lt	Double	Double	No		16
55	Hemiplegia vascular.....	?	Spasticity and moder- ate weakness on right	Exaggerated on right	Right	No	No	Right	17
18	Hemiplegia luetic endar- teritis.....	7 mos.	Spasticity and moder- ate weakness on left. Moderate contracture of hand	Exaggerated on left	Left	Left	Left	Left	18
54	Hemiplegia vascular.....	7 days	Spastic paralysis of left leg; flaccid of arm. Ankle clonus on left	Exaggerated left leg— equal of arms	Left	No	No	Left	19
54	Aphasia luetic.....	1 mo.	No spasticity clonus or paralysis. Aphasia	K J more active on left. Arm reflexes lively	No	No	No	Variable on left	20
35	Cerebrospinal lues.....	4 mos.	None	All exaggerated	Double	No	No	Double	21
58	Hemiplegia vascular.....	10 days	Slightly spastic paraly- sis of leg. Flaccid of arm (left)	Present	Constant. Extension on left	No	No	No	22
53	Urinary retention (tabes)	6 yrs.	None	All lively	No	No	No	Double	23
39	Jamaica gin habitué.....	10 yrs.	None	All hyperactive	No	No	No	Double	24
24	Post-puerperal psychosis	2 mos.	None	All hyperactive	No	No	No	Double	25
37	Cerebrospinal lues.....	2 mos.	No spasticity or clonus	Not obtained in legs.	Double	Double	Double	Double	26
57	Hemiplegia vascular.....	3 days	Slight spastic paralysis of leg. Flaccid of arm (left)	Present in arms Left exaggerated in legs; decreased in arms	Left	Left	No	No	27
35	Frontal tumor.....	3 mos.	Slight weakness and "tonic innervation" on left.....	All more active on left	No	Left	Left	Left	28
26	Thrombangeitis.....	3 yrs.	None	All lively	No	No	No	Double	29

Age	Diagnosis	Duration	Motor Symptoms	Reflexes	Babinski	Oppenheim	Gordon	Digitals	No.
52	Hemiplegia luetic.....	10 days	Complete paralysis on right. No spasticity or clonus	Reflexes on right	No	No	No	Right	30
50	Acute alcoholism.....	None	Lively of arms. Normal of legs	No	No	No	Double variable	31
23	Psycaesthesia.....	2 yrs. (?)	None	All lively	No	No	No	Double variable	32
28	"Conflict depression"....	1 yr.	None	All lively	No	No	No	Double	33
50	Paralysis agitans.....	9 yrs.	Typical signs of advanced case	All active	No	No	No	Right	34
38	Multiple sclerosis.....	2 yrs.	Spasticity, etc.	All exaggerated. Double clonus	Double	No	No	Double	35

Society Proceedings

CHICAGO NEUROLOGICAL SOCIETY

DECEMBER 16, 1915

The President, DR. JAMES C. GILL, in the Chair

DYSTONIA MUSCULORUM OR TIC

By Hugh T. Patrick, M.D.

Dr. Patrick said he had presumed to announce a case of dystonia musculorum, although it differed widely from typical cases of this disease. Indeed, it would never have occurred to him so to designate it were it not for his experience with two similar cases. Dystonia musculorum as reported up to date is almost confined to children of Russian Jews, begins in one extremity, becomes generalized, generally affects the lower extremities more than the upper and fairly early causes a tonic deformity of an extremity or of the spine. The patient presented was not a Jew, was twenty-seven years old, the disorder began as a facial tic at the age of nineteen, the lower extremities were not involved in the movements and there was no deformity. The case looked like a bad one of tic involving the face, neck, shoulders and trunk or a spasmodic torticollis which had spread to adjoining muscular groups. But two cases seen years ago made Dr. Patrick hesitate to call it either.

The first was a middle-aged man who had had similar spasmodic movements for years. They were generalized, but the legs not much involved. He had developed a marked permanent scoliosis in spite of an ingenious apparatus he had devised for stretching the spine and immobilizing the extremities. He finally became quite disabled and committed suicide.

The other case, which was under casual observation for years, in the beginning at the age of about twenty must have greatly resembled a spasmodic torticollis as an operation had been done on both spinal accessory nerves. The operation, if it had any effect, made matters worse. The spasms in the neck muscles grew worse and muscles of face, shoulders and trunk became involved. These contractions had many of the characteristics of a tic. The patient grasped the occiput to steady the head as do so many patients with "mental" torticollis. Although the neck, shoulders (arms) and trunk were in almost constant abnormal movement whenever this man became angry enough to fight, which was not very infrequent, the spasms instantly disappeared and he "always licked his man." This patient also gradually grew worse, developed very marked permanent spinal deformity, so that he was quite doubled over, though able to walk, and finally became quite disabled, though the legs were practically free. He was not seen during the last few years of life and cause of death is unknown.

These two cases ran a course so different from tic or torticollis and so similar to that of dystonia musculorum as to be at least suggestive. The case presented was very similar to them. It began in young adult life, apparently as a facial tic to which was soon added a spasmodic torticollis. Some six or seven years ago an operation was performed on both sides of the neck, without benefit. Then shoulders and trunk became involved. He presented at

different moments torticollis, tortitorso, occasionally slight tortipelvis, violent movements of the shoulders and some facial movements. The movements are not quite like those of tic. Most of them are slower and of a writhing, twisting character. The trunk and shoulder muscles are much more involved than one sees in tic, and the movements are less under the control of the will.

Dr. Moyer asked if the movements all stopped when the patient was asleep.

Dr. Patrick replied that they did. So do the movements of dystonia musculorum.

Dr. Peter Bassoe was glad Dr. Patrick brought up the subject of dystonia musculorum, and showed the patient, even though there might be considerable doubt as to whether it was really a case of dystonia. The speaker was rather disappointed in seeing such a marked resemblance to a generalized tic. Without knowing anything about dystonia, he would not hesitate to say that it was a case of generalized tic. If it was a case of dystonia, then he was quite certain that a case he saw a few years ago, and which Dr. Grinker also saw, was a more typical one, namely, that of a woman, then twenty-four, a Polish Jew. The history was that she had been married for six years, and during her first pregnancy, at the age of nineteen, she developed a peculiar sensation around the right shoulder. Very soon she developed movements, chiefly twisting of the trunk, and she would often fall when walking. She had not developed other tic movements of any consequence. She had been in several hospitals, but no treatment ever had any material effect. Under the speaker's care she was given exercises, which seemed to help, but before she left the hospital she was as bad as ever. When Dr. Bassoe exhibited this patient he stated that "tortipelvis" or rather "tortitorso" was a good term for her condition—a rotary spasm. One particular thing about this case was that the woman did not have the usual mental state that is generally seen in advanced tic cases.

Of course, most of the cases described as typical have been in children, and we must be a little slow in including cases that begin in adult life. It was quite convincing to hear the cases reported by Dr. Patrick, which in the beginning to all intents and purposes looked like tics and later turned out to be undoubted cases of dystonia.

Dr. Julius Grinker said that if the case presented was a case of dystonia musculorum, then there are many such cases in Chicago. He has always considered cases such as the one shown to be generalized tics, following the teachings of authors, including Dr. Patrick. The case reported by Dr. Bassoe was considered by all who saw it to be one of tic. The fact that the woman tilted to one side was attributed to a psychic trauma combined with a physical trauma sustained some years previously, which inclined her to have a tic with a twist to that side, a slight torsion.

Dr. Grinker was glad Dr. Patrick called attention to this disease as being something other than generalized tic, and he would like Dr. Patrick, in conclusion, to dwell particularly upon the differential points between generalized tic and dystonia musculorum. The mere fact that treatment is of no avail in some cases, and that others go from bad to worse has already been emphasized by Meige and Feindel for generalized tic, and we all see cases in which there is no change.

The speaker observed that when Dr. Patrick talked to the patient, the tic subsided, practically all movements stopped; that when the members examined him and felt of his shoulder muscles, the movements ceased. This is a well-known characteristic of tic—that some voluntary control over the movements remains, and Dr. Patrick emphasized this point time and again. He would like Dr. Patrick to tell him of a method that would enable him to pick out a case of the disease he described from one of generalized tic. Up

to this time he had not heard any of the real differential points. The cases hitherto described in the literature occurred in children. Though the new symptom-complex is extremely interesting, still no convincing differential points have been given in this presentation as between generalized tic and dystonia musculorum.

Dr. Meyer Solomon thought Dr. Patrick had done well in bringing the subject up before the Society. Although he had never seen a case of dystonia before, he had read descriptions of these cases, especially the paper by Fraenkel, and, judging from this paper, he would not conclude that this was a case of dystonia. But what is dystonia musculorum? Is it not a form of tic which is rare and attacks the hip muscles and lower extremities? It seems to him nothing more than that. A remark made by Fraenkel is very interesting, namely, that in the early years of life, when dystonia occurs most frequently, the muscles that are used to the greatest extent, like the facial and those of the hip and lower extremities, are the ones affected. Since these muscles are used to the greatest extent at that age, tics in that region are more frequent. But since the facial muscles are used far more frequently than the muscles in the region of the hips and lower extremities, therefore tics of the facial muscles are far more frequent than those of the lower extremities and hips. At a later age (after puberty) the muscles of the upper extremity are beginning to be used to a greater extent even than those of the lower extremity. At that age, then, we are especially apt to have tics of the upper extremity. No doubt the occupation of the individual has a great deal to do with the condition. In the end, it seems to him that these cases are all fundamentally the same, with different manifestations in different parts of the body, and that it really depends upon the local resistance or susceptibility. Fundamentally, they all show a spasm.

Dr. Patrick referred to arthritis of the spine and upper extremity as an irritating factor. Even if there is, perhaps, in some instances a local irritating factor, the basic thing is the tendency toward disintegration, with the cropping out of physical reactions in an automatic way, which should be controlled by the higher centers. It is simply the cropping out of old phylogenetic or ontogenetic types of reaction which should be controlled by the upper cortical regions, and it shows the tendency to disorganization of the functions of nature.

He noticed that in replying to questions the man presented had a rather monotonous speech, which the patient said he did not have when younger. It has been increasing in the past few years, and his friends have remarked about it.

Dr. I. L. Meyers had not seen any cases of dystonia. He would think, however, that one of the primary factors in dystonia musculorum would be some disturbance in the tonicity of the body musculature. What evidence of hyper- or hypo-tonicity had the man? As he understood, in the cases of dystonia the muscle-tone is altered in one direction or the other.

Dr. James C. Gill asked Dr. Patrick what he considered were the relations of this condition to that described by some writers as "electric chorea."

Dr. Patrick, in closing the discussion, said he could not very well answer the question of Dr. Gill as he had no very clear idea of what electric chorea was. He believed that several different disorders had been so called.

Replying to Dr. Grinker, he thought that a case of typical, fully developed dystonia musculorum was now easily distinguished from tic, but it was of interest to note that many of the reported cases had in the beginning been thought to be tic. The principal distinguishing traits would be the deformity of trunk or extremity, the labile spasm with local hypertonicity, the diversity of movements, great involvement of trunk muscles and the relatively small influence of volition and diversion. Early in the case, however, the spasms

of dystonia musculorum may be greatly influenced by suggestion or other psychic processes. As to the case shown, Dr. Patrick said that he had already stated that except for personal experience (always an unsafe guide) it never would have occurred to him to call it other than tic or mental torticollis with spread to other muscles. But he thought the trunk muscles involved to a very unusual degree; as in dystonia musculorum it was especially the roots of the extremities which were affected; there was greater diversity in the character of the movements; in tic he had rarely seen the rather slow, twisting movements so frequent in this patient; some of the movements could hardly be carried out voluntarily, while all movements of tic can be executed by a muscularly expert person.

Whether or no dystonia musculorum is a form of tic might be a matter of opinion and Dr. Solomon was entitled to his. Dr. Patrick was decidedly of the opinion that it is not. In the early stages cases have been thought to be tic, hysteria, athetosis, chorea, Wilson's disease, etc., but prolonged observation by a competent man has changed the diagnosis to this disorder, which is supposed to be a disease entity of as yet unknown pathology.

PRESENTATION OF A TABETIC CHILD AND PARETIC PARENTS AND BROTHER

By H. J. Smith, M.D.

Dr. Smith presented a family of four, all presenting symptoms of luetic disease, two being acquired—the father and mother, and two congenital—the children. The man was married about nineteen years ago and admits luetic infection. Within a year after marriage the wife showed venereal lesions, and her hair came out. Her first pregnancy resulted in a child that lived six weeks and died. The second pregnancy resulted in still-birth. The third is a living girl, sixteen—the patient shown. The fourth is a boy of fourteen. The father was a pressman and became confused while going home from work in 1912. He was taken to the Garfield Park Sanitarium. He lost his speech during this attack, but it returned in three days. He was given two doses of 606 at the Sanitarium, and also some injections of mercury, with some improvement. He tried to get employment, but was unable, and was sent to Kankakee in September, 1912, and stayed there for about a year, when he escaped. He tried to get work in two other cities, but was unable to do so, and came to the Chicago State Hospital in 1913, when Dr. Smith first saw him.

Dr. Smith's attention was attracted to the girl when she was visiting her father, as one of her pupils was larger than the other. He obtained permission from her mother to examine her, and found that one of her pupils was twice the size of the other. The condition of the mother's eyes was the same, and she said that her mother had the same thing, but this he doubted. He then lost track of both the mother and daughter, and did not see them again until last summer, when he again examined the little girl and made a Wassermann on the blood and spinal fluid, which was positive on both. The fluid showed thirty cells to the cubic mm. and a positive globulin test. The physical examination showed unequal pupils; light reflex practically gone; lost deep reflexes in the lower extremities; some failure of vision. She complained of nothing but failing vision and some headache, but nothing very definite. There were no crises; no lightning pains nor girdle sensations. An ophthalmoscopic examination was made, and some paleness of the eye grounds noticed. The ophthalmologist told him that it might be a beginning optic atrophy without knowing anything about the patient. Her vision was

quite a little reduced, more than half, but not so badly as might be expected under the circumstances. Dr. Bassoe saw the case, and was not exactly sure about the diagnosis, but thought it might be a case of beginning tabes on the basis of congenital lues.

On Thanksgiving Day Dr. Smith saw the brother, fourteen years of age, and found him with one pupil about twice the size of the other; no light reaction; accommodation reflex present, however; no Rombergism; knee jerks present and active; hesitating speech; marked shuffling of gait; tremor of the facial muscles. He was not doing well in school, and getting worse during the last six months. The girl is in the sixth grade of the public school. Her principal difficulty is due to her eyesight. The boy, however, did not seem to be of average intelligence, but still not markedly deficient. A Wassermann on the blood was strongly positive, but spinal puncture was not done.

The mother's Wassermann test was positive. She has unequal pupils; no reaction to light; exaggerated knee jerks.

Regarding the father, he has been in the institution since 1913. At present he is in a period of remission. He is working and acquits himself well. He loses his temper, however, on slight provocation. He forgets occasionally, but aside from that is better. He has an Argyll-Robertson pupil; exaggerated knee jerks and a few other classical symptoms of general paresis, but the only discrepancy in the whole picture is this: The spinal fluid in the father is persistently negative to the Wassermann test.

Dr. Hamill asked what the cell count was.

Dr. Smith replied that it was always down under half a dozen cells. The globulin reaction was very faint and sometimes absent.

Dr. Hamill asked if the patients had Hutchinson teeth, to which Dr. Smith replied that the boy had some. There is a very little evidence of this condition in the girl.

Dr. Julius Grinker said that it has been his experience that some undoubted cases of tabes have failed to give a positive Wassermann reaction, either in spinal fluid or blood. There are two cases now in the county hospital which had formerly been treated with salvarsanized serum. Wassermann had become negative, but the disease continued to progress. He has another case of unmistakable tabes, with late symptoms—a classical case—and yet there is a persistent negative Wassermann in both blood and spinal fluid.

This presentation interested him very much, for he had the good fortune to study a similar luetic family in 1904, the report of which was published in full in the December issue, 1904, of the *JOURNAL OF NERVOUS AND MENTAL DISEASE*. In that family there was a case of tabes (mother), juvenile tabes (son), juvenile paresis (another son); the father had died of syphilis; an only daughter died of brain syphilis (gumma), and the mother of tabes with optic atrophy. The pathological specimens and microscopic sections of two cords and of one brain were presented to this Society.

Though some have maintained the existence of a special syphilitic nerve poison, this has not been proven. It appears, however, that in certain families syphilis invariably affects the nervous system. Instances of this are not so rare. Even that afternoon Dr. Grinker demonstrated before his Cook County class two cases of nervous lues—husband and wife—affected in exactly the same way. The wife is a sufferer from cerebral lues—right-sided hemiplegia, with aphasia, and subsequent involvement of the cord structures. The husband had just recovered from a right-sided hemiplegia, and still suffers from partial aphasia. Both contracted the disease at about the same age. The correct explanation for such familial tendencies is still to come.

A CASE FOR DIAGNOSIS

By Julius Grinker, M.D.

Patient, a school-boy, 14 years old, entered Dr. Grinker's service at Cook County Hospital on December 7, 1915. The onset of his illness dates about one year ago. The beginning was gradual, with a feeling of weakness in the neck muscles patient experiencing difficulty in maintaining neck and head erect. When this condition had gradually improved, he began to stagger in walking and generally felt uncertain on his feet. About the same time his speech became less distinct—syllables were slurred and there was present what might aptly be called "explosive" speech. A symptom attracting his own family was his rapid growth during the last year—about twelve inches. There have been no other disturbances—neither headache nor vomiting. Special senses normal. The optic nerve presented neither edema nor atrophy; perhaps the outer nerve head on left side was slightly paler than the one on the right side, but not sufficiently so to call it pathological. The family and personal history is unimportant. Intelligence is of the average type and memory not impaired, though the mother thinks that patient is not as bright as formerly. There is no similar trouble in the entire family; in fact, it is free from all forms of nervous disease. Examination reveals normal viscera, negative urine, blood and spinal fluid (both tested for Wassermann). Radiographic examination of skull in two positions demonstrated an exceedingly small sella turcica with well-defined anterior and posterior clinoid processes.

Nervous Findings.—Deep reflexes are generally exaggerated, but no pathological reflexes are present, nor is spasticity a symptom. Motion and sensation normal everywhere. Extremities are markedly elongated, but the soft parts show no excessive development. Face is normal. There are nystagmoid jerkings in extreme lateral positions of the eyes, though no spontaneous nystagmus has been observed. Tremor is present in tongue and in fingers, but not of the intention variety of multiple sclerosis; the tremor partakes more of ataxia than of motor disturbance. The gait is markedly ataxic and of the cerebellar variety. Speech is of the scanning type, monotonous and without accentuation of syllables, occasionally slurring. Abdominal reflexes are both well marked. The thyroid is somewhat enlarged.

In observing this patient one is struck by the symptoms of what one might call the cerebellar syndrome, yet the rapid growth must lead one to think of hypophysis disease. However, the absence of enlargement of that organ as shown by the radiogram must turn our attention to other possibilities.

Dr. Grinker, in replying to Dr. Bassoe, said that the patient had had headaches once or twice, but this was not a prominent symptom. There were no atrophies or dystrophies. He has had transient vertigo on one or two occasions. The abdominal reflexes are present. Mentality normal. Patient attends school. Has had no fainting spells; no epileptiform convulsions, but vomited once.

Dr. Meyer Solomon said that it seemed to him that Dr. Grinker had not mentioned a possibility that is perhaps most likely, namely, multiple sclerosis. It is true that there are slight suggestions here and there of ductless gland disorder, but nothing specific or definite to get hold of. Possibly observation over a prolonged period may bring out the fact whether or not there is really a ductless gland disorder.

One point with reference to cerebral roentgenology: The present standpoint of the foremost men in that line of work is that the single exposure is valueless; that in order to get an idea, especially of the pituitary fossa, there should be several exposures in different positions, and that the best way is the stereoscopic view.

Dr. Peter Bassoe asked about the sugar tolerance, to which Dr. Grinker replied that these tests had not yet been made.

Dr. Sigmund Krumholz thought that the case presented by Dr. Grinker required more detailed analysis and longer observation to definitely determine upon the diagnosis. The unusually marked growth of the patient in the last few months would make one suspect some disturbance of the hypophysis. If the X-ray picture would show a separation of the epiphyses in the extremities of the patient, it would strengthen the latter suspicion. Physically, the patient is partially infantile. It would be interesting to know whether he also shows signs of psychic infantilism. On the other hand, the neurological symptoms, namely, the nystagmus, ataxic gait, with tumbling toward the right, are suspicious of some pathological process in the area of the vestibular tract and cerebellum. As a whole, the case, as presented, is suspicious of a hypophyseal affection and lesions in the area of the cerebellum and vestibular tract.

Dr. Grinker (closing the discussion) expressed the view that the most probable diagnosis of the case is multiple sclerosis. While he thought that there must be a liberal representation of patches in the cerebellar territory, it is not unlikely that some sclerotic patches will also be found in the glands of internal secretion, thus stimulating excessive growth in the long bones. This view he believes not incompatible with the appearance of the roentgenogram showing a small sella, as it is not impossible for a patch of sclerosis to irritate the glandular tissue without causing hypertrophy of the same. However, this is pure hypothesis, and he ventures to put it forth, because no one has attempted any other explanation of this interesting case.

FACIAL HEMIATROPHY

By James C. Gill, M.D.

Miss J., 18 years of age, born in Chicago.

Family History.—Father 48 years of age, born in Norway, steamfitter by occupation. Mother 45 years of age, born in Norway also. Both parents are healthy; no history of any nervous disorder on either side of the family. Grandparents, uncles and aunts, so far as can be determined, showed no hereditary trouble. Miss J. has five sisters and one brother all in good health.

Past History.—The mother states that birth was normal. Infancy and early childhood passed without any serious ailment. Physical and mental development normal. Present trouble was first noticed at six years of age. The first manifestation was a slight discoloration of the skin in the region of the infraorbital foramen on the left side. The mother says this followed an injury to the left cheek caused by running against the corner of a sewing machine. From this starting point there has been a gradual but progressive involvement of the skin, subcutaneous tissue and bony structures about the left side of the face and extending to the frontal region of the skull.

It is interesting to note apparently that the disturbance is confined to the distribution of the sensory branches of the trifacial nerve. At no time has the patient experienced any considerable pain, only occasionally slight neuralgic disturbances of no special consequence. Electrical tests show an absence of R. D. An examination of the mouth reveals a congenital absence of the first and second lower bicuspid on the left side. Examination of the eyes shows slight inequality of the pupil, the left being smaller than the right; eye grounds normal. The patient states that over the involved area there is a condition of anidrosis that has been noticeable for a number of years.

An interesting part of Miss J.'s history is a nervous disturbance beginning at nine years of age, when she had a convulsive seizure, epileptiform in character. These epileptiform seizures have persisted at irregular intervals since, assuming the nocturnal type, never having occurred during the day. But she describes a sensation occurring rather frequently during the day, manifested by slight vertigo or confusion, bearing the stamp, it seems, of the *petit mal* type of epilepsy. Headaches of the migrainous form have persisted at infrequent intervals for several years. The functions of the organs of the body, aside from those mentioned above, are performed, so far as can be determined, in a normal way.

Dr. Gill suggested that such condition might be due to a perverted function of the trifacial and associated sympathetic nerves, complicated frequently by epileptiform seizures. Questions not satisfactorily answered: Why this disorder occurs more frequently in early life? Why it occurs more frequently in females? Why is it so frequently accompanied by epileptiform seizures?

Dr. Meyer Solomon thought the case extremely interesting, and it seemed to him that, although there was a history of injury immediately antedating the development of the hemiatrophy, injury was probably nothing more than an inciting factor; that the predispositional factor was previously present. It seemed to him that a nutritional disorder of some sort, the presence of migraine, plus the epileptiform spells, shows that there is something more than merely the hemiatrophy in this case. These are all probable manifestations of some underlying state.

He thought thyroid extract was being tried by some in facial hemiatrophy, with some reported improvement in the condition. In Dr. Gill's case, however, on account of the long history of the condition, it had probably become ingrained into the system, as it were, and thyroid or other ductless gland products might be of no value, but he wished to suggest the treatment and that it might be worth trying.

Dr. Peter Bassoe thought the largest statistics gathered on hemiatrophy were those of Stier, who has been paying so much attention to right and left-handedness. He pointed out that most cases are on the left side, and that in left-handed persons it usually occurs on the right side, *i. e.*, it affects the "inferior" side.

On looking at the patient, it would appear to him that at a distance one would at once think of some circulatory disturbance—a nevoid condition, and with the history of convulsions we recall the cases of nevus or angioma of one side of the scalp and face, extending into the meninges and causing convulsions. Here we apparently have the opposite condition, namely, a decrease in vascularity. After all, there may be something of that sort about it—something nevoid, and it may be that the convulsions are focal. Are there any changes in the reflexes?

Dr. Gill replied in the negative.

Dr. S. Krumholz said some observers have reported cases of epilepsy with left-handedness, which present minute cortical changes. In the cases of epilepsy associated with left-handedness, Redlich, on careful examination, frequently observed a slight paresis, on the opposite side of the body, especially immediately after the seizure. This corroborates the assumption that epilepsy with left-handedness has an anatomical basis. As Dr. Gill's hemiatrophy case has epilepsy and is left-handed, it occurred to him that this affection might possibly be due to a pathological process in the cortex or sub-cortical region.

Dr. Gill (closing the discussion) had hoped that someone would enlighten him regarding the question, especially as to why it occurred in the young, and more frequently in the female.

Dr. Meyer Solomon said that if it is due to a ductless gland disorder, we know that the ductless gland system is more unstable before twenty years of age, and also that it is more unstable in women than men. That might be a possible answer.

Dr. Gill said that was interesting, in lieu of any other explanation, and he accepted it for what it was worth. The case interested him. Might it not be possible that the same causative factor underlying any case of epilepsy, of nocturnal or diurnal type, was responsible for this condition, regardless of the presence of the facial hemiatrophy? Possibly there is a vasomotor disturbance underlying the trouble. These things had suggested themselves to his mind.

JANUARY 20, 1916

The Vice-President, DR. LEWIS J. POLLOCK, in the Chair

Dr. Lewis J. Pollock read a paper on The Cause of the Allorhythmic Type of Tremor in Paralysis Agitans.

Dr. H. J. Smith understood Dr. Pollock to say that some of the men who had studied these tremors previously did not find this same variation in rhythm, and he wondered if these men had studied them in the same thorough way as Dr. Pollock, or whether they had guessed at the results without taking simultaneous tracings with recording apparatus.

Dr. Harold N. Moyer asked if the condition described bore any relation to the heart's action or does voluntary respiratory inhibition affect the tremor.

Dr. Pollock (closing the discussion), in answer to Dr. Smith, stated that investigations have been made relative to the probable relation between respiration, circulation and these tremors by Maude, Marie and Wertheim-Salmonson. Marie made a tracing in which he showed the carotid pulse along with the tremor. The tremor was not a regular allorhythmic tremor. Wertheim-Salmonson showed a tracing that he admits is not a very clear one, with which opinion we are forced to agree. It is not even an ordinarily good tracing. The tracing of the circulatory movements is very poor, and the nodes of the tremor irregular.

Perhaps to further reply to Dr. Smith's query, he would reply to Dr. Moyer: There is one notable feature about the allorhythmic type of tremor in paralysis agitans, namely, you cannot get it unless the patient is in a state of complete distractability; that is, he should have no conscious knowledge that you are particularly interested in getting any definite result, because as soon as he becomes interested in his own tremor, then the character of the tremor immediately changes, and you no longer get these nodes. When he commanded the man to stop respiration, it is true, he did get cessation of the allorhythmic type of tremor, but it continued long after breathing recommenced. Other factors, such as excitement, etc., brought on an atypical tremor.

The reason respiration has not been recognized as being essential to the causation of these nodes is that they have not been studied extensively enough. For many have been content with the works of preceding authors, and such work has been based on perhaps one tracing, and that obtained under imperfect conditions.

WASSERMANN REACTION IN FEEBLEMINDEDNESS

By H. C. Stevens, M.D.

Dr. Stevens said that attempts have been made to show that inheritance in accordance with Mendel's law is the chief cause of feeble-mindedness. The

writers advocating this view have neglected important pathological factors. The findings of A. W. Wilmarth in one hundred consecutive autopsies on mentally defective children show that in 82 per cent. gross pathological lesions of the brain, blood vessels or meninges were present. Fournier was the first author to point out the possibility of imbecility as a parasymphilitic affection. It is now possible by means of the Wassermann reaction to demonstrate the presence of syphilis in the feeble-minded who do not present the classical stigmata of congenital lues. The more important studies of the Wassermann reaction in feeble-mindedness are shown in the following table:

WASSERMANN REACTION IN FEEBLEMINDEDNESS

Year	Investigator	Per Cent.	Cases
1908	Raviart, Breton, Petit, Gayet et Cannac	30.9	246
1909	Kellner, Clemes, Brückner, Rautemberg	6.0	216
1910	Lippmann	13.2	78
1910	Dean	15.4	330
1910	Atwood	14.7	204
1911	Thompson, Boas, Hjort, Leschly	1.5	2,061
1911	Krober	21.4	262
1911	Chislett	45.0	20
1913	Fraser et Watson	51.0	105
1913	Froesch	50.0	102
1915	Psychopathic Laboratory, University of Chicago	30.9	314

The age of the patient is an important factor determining the strength of the Wassermann reaction. This is conclusively shown by the following table, which is drawn from Dean's article. It shows the correlation between the age of the patients and the per cent. of positive Wassermann reactions.

WASSERMANN REACTION OF MENTAL DEFECTIVES IN RELATION TO AGE

Age of Patient	Number Examined	Number Positive Reactions	Per Cent. Positive
5 to 10 years	94	20	21.27
11 to 15 years	142	24	16.90
16 to 20 years	66	4	6.06
21 to 30 years	24	3	12.50
31 to 44 years	8	0	0

Dr. Bayard Holmes said that he was not prepared to discuss the subject of the paper, because he had had no practical experience with the Wassermann in this condition. He has read the Goddard books and the Davenport propaganda, but his judgment did not indorse their conclusions. He looks for other causes beside syphilis in congenital defects and in mental inferiority, *e. g.*, toxic conditions in the parents, nutritional defects in the early years of life. Dr. W. H. Lorenz, of Madison, Wisconsin, has made the Wassermann examination upon all the feeble-minded in the institutions in the state of Wisconsin, and it would be very easy for Dr. Stevens to obtain his statistics.

However, it seems to Dr. Holmes that feeble-mindedness must be studied in a still more comprehensive manner, and, as Dr. Stevens says, that we ought to examine carefully the brothers and sisters and the parents, not only by the Wassermann but coincidentally by every other serologic and clinical method. Perhaps all has been already accomplished that may be expected of isolated studies of many patients by a single method. In the future one patient must be studied over a long period by every laboratory and clinical

method and many patients at one time by every possible method. The examination must be comprehensive, intensive and coincident. Great tact and patience is necessary in carrying out successfully such studies. The truth, however, will come forth when the material has been sufficiently beaten, but there must be no break in the line of beaters.

A boy consulted the speaker's son for an obvious reason of a temporary and trifling nature, and it was discovered that syphilis was the bottom of it. He was treated with great success. The young fellow straightened up, got to looking husky and manly, his wages were raised, and he was greatly benefited. The father next came to see the doctor. He complained of a trifling affair, but Dr. Holmes made a Wassermann which was positive and the man was immediately put under treatment, with great improvement. The next who came was the mother. Up to this time Dr. Holmes had not been to the house. He made a clinical diagnosis, but had a Wassermann made before giving treatment. This was positive, and so he instituted treatment, again with good result. The mother then asked him to look at the daughters—two of them. They had been going to school, but could not get along in their studies, and they wanted him to find out what was the matter with them. Examination showed positive Wassermans and luetins. He treated them, and they also improved, the younger one so marvelously that she became the most erudite of all. That was a family affair, and it was a well-conducted, worked out case of social medicine.

Dr. Holmes is not carried away by the popular propaganda for sterilization of the feeble-minded, the criminals, the insane, the sick or the poor. He believes legal provisions in this direction are irrational and dangerous. He does not wish to ridicule it, but really it is one of those two conditions one cannot argue. There is not enough to stand on to begin an argument. You cannot defend an axiom, and you cannot refute an absurdity.

Dr. Peter Bassoe asked Dr. Stevens if he analyzed his own material according to age, as Dean has done.

Dr. Stevens replied that he did not. He did not feel that he had a sufficiently large number of cases to make it profitable.

Dr. Stevens (closing the discussion) said there were several points in the variation of results that interested him. A variation from 1.5 per cent. to 50 per cent. is a pretty large one. He thinks that it is to be accounted for partly by the age of the patient, partly by the difference in technique employed. A good deal of the work was done soon after the Wassermann technique had been elaborated and developed. A part of it is to be explained by the difference in the incidence of syphilis in different parts of the world. That is a matter, of course, that would have to be tested out at some later date.

RESOLUTIONS ON THE DEATH OF DR. HENRY BAIRD FAVILL

WHEREAS, On February 20, 1916, Dr. Henry Baird Favill departed this life; and

WHEREAS, For many years he had been a beloved and admired member of the Chicago Neurological Society; and

WHEREAS, Dr. Favill was not only a physician of great skill and unusual scientific attainments, loyal alike to his patients and his ideals, great in his kindness as in his strength, but also a man of marvelously manifold and wonderfully effective activities in the broad sphere of humanitarianism; therefore, be it

Resolved, That in the passing away of Dr. Favill the Chicago Neurological Society, the medical profession, the city of Chicago and the people of

the United States have suffered a great loss, but that we are bigger and better for his having lived and labored; and be it

Resolved, That we extend to his bereaved family our profound sympathy, that these resolutions be spread upon our records, and a copy thereof sent to the family of our late associate, and to the JOURNAL OF NERVOUS AND MENTAL DISEASE.

(Signed) HUGH T. PATRICK,
Chairman,
LEWIS J. POLLOCK,
SIGMUND KRUMHOLZ,
Committee.

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

FEBRUARY 17, 1916

The President, DR. EDWARD B. LANE, in the Chair

INDICATIONS FOR HYDROTHERAPY AND WET PACK IN ACUTE PSYCHOSES

By H. M. Adler, M.D.

The analysis of 1,000 cases observed at the Psychopathic Hospital, Boston, was presented. Dr. Adler said that hydrotherapy and wet packs had been used in insane hospitals for many years to immobilize and restrain violent patients. The method of application varies in different institutions but in most hospitals excitement is the main indication for its use. Harmful effects have been noted in some cases where this was used as an indication, especially in those patients whose past history and physical condition were not known. For this reason Dr. Adler has tried to pick out from the records the cases which do well under this treatment.

The best indication seems to be cyanosis of the hands and face and a low temperature. Wet packs in these cases conserve the body heat and thus retain needed energy. Both bath and pack are theoretically best given at 95° to 98° F. While packs may be at this temperature when just applied, they do not retain this degree of heat long but fall to the body temperature. Baths can be held at approximately an even temperature. In many patients the temperature regulating mechanism is upset. Heart stimulants are also very valuable. Digitalis subcutaneously is usually given whether patient shows signs of needing it or not.

Dr. Adler analyzed 309 cases, 1,000 packs being used. In 82 cases of dementia præcox 217 packs were used; 143 had a quieting effect, 74 had a non-quieting effect. In the manic-depressive group, out of 336 packs used on the manic patients 136 had a quieting effect and 200 had a non-quieting effect. In the depressed (mixed) patients, of 26 packs, 8 were quieting and 18 were non-quieting. In the other groups, such as alcoholic hallucinosis, organic dementia, senile dementia, involution, delirium tremens, etc., the majority of the packs had a quieting effect. Most of the packs were for two hours.

Dr. Adler drew the following conclusions: (1) That in a large number of the psychic states, packs do well. (2) In maniacal cases packs do not work as well. (3) Cyanosis is a better indication for hydrotherapy and wet packs than excitement. (4) In some cases excitement may be prevented by this treatment.

Dr. J. J. Putnam asked whether the sheets do not cool off so quickly, even when they are wrung out in hot water, that they have the effect of a

cool application, and whether this is not an important element. He finds it difficult to get away from the idea that besides the effect on the cutaneous nerves due to the prolonged contact with warm water, it is always of some service to start, through cool or cold applications, the wave-like contractions such as have been shown to result in an ebb and flow of the blood favorable to nutrition.

Dr. Gregg asked whether in the manic state the patients are not getting more food and fluids and whether this does not play a part in the treatment.

Dr. H. M. Adler said as the sheets are used they are probably not very much below the correct temperature. The cyanosis is probably not an atonic condition, but a cerebral one, something like that seen in high altitudes. The body may be set at a new respiratory point. The important point seems to be that the patients are losing heat. The water taken in does not supply heat. Although he said he had no statistics at hand, he felt that forced feeding and water were not of great importance in conserving the body heat in these cases.

A FAMILY GROUP SHOWING TRANSITION IN PSYCHOTIC TYPE

By J. F. O'Brien, M.D. (Taunton State Hospital, by invitation)

A family group of five sisters was reported showing a transition of mental symptoms from a paraphrenia systematica to a hebephrenic dementia præcox. The ages were from fifty-one to thirty-nine, with a duration of their disease of about ten years. Under the headings of delusions, hallucinations, emotional tone, motor phenomena, dementia, personality, and physique, each patient was carefully analyzed. Dr. O'Brien said that we have a decided transition from a coherent, systematized chain of delusions in the first patient to a rather incoherent, unsystematized chain in the third, finally, owing to the extreme dullness and apathy along with the concomitant dementia of the last two patients, fading into vagueness and indefiniteness. The hallucinations which were present, though not prominent in the first case, became more prominent and numerous and recent in the second, still more prominent, varied, fantastic, numerous and recent in the third, and then after reaching their acme, as it were, became vague and indefinite in the last two. Emotionally, the transition is especially marked, as the first patient is pleasant, amiable and courteous; the second less so, the third decidedly surly, suspicious, hostile and querulous, and the last two are dull and apathetic, but especially the last one. As to motor phenomena, the first two present nothing of special note, the third shows a degree of negativism, the fourth is more negativistic, and is shy and seclusive, the last one is still more negativistic, shy and seclusive, and, furthermore, is most untidy. There is no dementia in the first two; incipient dementia is suggested in the third; and the dementia which is marked in the last two has seemingly been stationary and earlier in the older, and is very progressive in the younger. The personality in the first two is intact and independent; beginning to disintegrate in the third; has undergone much disintegration in the fourth; and is rapidly disintegrating in the last. The physique of the oldest is excellent, as she is strong, portly, of healthy complexion and round of face; the second one has more prominent features, less round of face, is strong and less portly; the third one has sharp features, thin face, a slightly uptilting nose, a receding chin, and is of a wiry build; the fourth one has sharp features, thin face, a more uptilting nose, a more receding chin, and is of a delicate build; the last one has less sharp features than the third, a more full face, no uptilting of the nose, slight recession of chin, and is flabby, fat and anemic.

It is therefore seriously considered from a study of these five cases that

the disease entities under the captions of paranoia, paranoid dementia præcox and hebephrenic dementia præcox are the same disease varying in intensity.

A METHOD OF FAMILY STUDY AND SOME RESULTS

By A. Myerson, M.D.

The material studied is from the Taunton State Hospital in southern Massachusetts, which has as a part of its district the Cape Cod and the south shore counties, largely settled by people whose ancestry goes back into the colonial days. The families studied number six hundred and sixty-three, and the records accessible go back to 1854. They have been analyzed according to relationship, in time of onset of psychosis and to type of psychosis presented.

The female sex predominates in these families, both in the total number of cases and in their groupings, such as for example mother-daughter group as contrasted with father-daughter group, or mother-son group as contrasted with father-son group, sister group as against brother group, etc. This is despite the fact that in the Taunton State Hospital, at most times in its history, the male sex has been numerically superior.

Concerning anticipation, a term used by Mott to designate the state of affairs which is shown when a descendant enters an insane hospital at an age earlier than did his ancestor, working back to the onset of the psychosis in these families, it is found that by far the great majority of the ancestors entered at a very much later age than did the descendants, and this is quite uniformly the case in father and the descendants group, mother and descendants group. Furthermore, a majority of the cases, where the ancestor is older than the descendant, show a large difference between the ages, whereas a minority of these cases show a small difference between the ages of onset. On the other hand, in a small number of cases where the descendant is older at the time of onset than the ancestor, the difference is not great and the ages are much more nearly equal than in the first named group. Thus, Mott's anticipation statistics are quite abundantly verified in the case of the Taunton State Hospital families.

What is termed the transformation of a psychotic type has been considered. It is shown that in the great majority of cases, where the psychosis is of unlike type in ancestor and descendant, the psychosis starts earlier and is of a severer type in the descendant. Where the psychosis is of like type, it is of earlier onset and more associated with dementia in the descendant than in the ancestor. There is, however, a smaller group of cases which show a reverse direction, that is to say, in the ancestor the psychosis comes on earlier and is of a more severe type. It will thus be seen that both from the standpoint of the age of onset and the transformation of a psychotic type, two tendencies are noted:

One, and the most striking, a tendency for the disease to grow worse in the descendants who come to the insane hospitals.

Two, a much less marked tendency for the disease to grow better in those descendants who appear in the hospitals.

This subject is to be treated *in extenso* in a monograph soon to be published.

NEUROLOGICAL ASPECTS OF FOOD POISONING

By Arthur Fairbanks, M.D.

Food poisonings are roughly divided into intrinsic and extraneous food poisons. The intrinsic ones are those which occur normally in food, prin-

cipally in fish, fungi and potato. Most of the fish are European ones and many are poisonous at certain times of the year, the ovaries being the specially poisonous part. Very few have any effect on the nervous system except when taken in very large doses and then the disturbance is probably a general toxic one and not a specific nervous disease. Shell-fish do not usually come in this group, as their poisonous effect is usually due to bacteria.

The extraneous food poisons are those that carry bacteria, such as meat, sausage, fish, shell-fish, vegetables, cheese, etc. The bacteria are the important element, and their presence is usually due to some faulty manner of preparation or preservation. The chief bacteria are *B. enteritidis* (Gaertner), *B. paratyphosus*, *B. proteus*, *B. coli*, and the hay bacillus. *B. enteritidis* (Gaertner) does not alter the appearance of the food which may harbor it. Its toxin is not destroyed by heat. The most marked effects are on the gastro-intestinal tract, the effects on the nervous system being slight and probably due to a secondary infection. The toxin does not affect the central nervous system specifically. *B. paratyphosus* is usually carried by humans and transmitted through their discharges. It has no specific effect on the nervous system. *B. proteus*, *B. colon*, and the hay bacillus all cause putrefaction and may be found in any foods. They produce no characteristic nervous symptoms but, in very large amounts, may produce the effects of a general toxemia.

Of the bacteria which have a specific effect on the nervous system, the *Bacillus botulinus* is best known. It was first noted in the epidemics of "sausage poisoning" in Germany and was found to act largely on the medulla to produce acute bulbar paralysis in most cases in about twenty-four hours. As the bacillus is an anaërobie, the food must be kept from oxygen for some time. The toxin is also very sensitive to heat. Very small amounts are fatal to animals. The symptoms, which have been produced in animals, are: more or less marked ophthalmoplegia, both externa and interna, dysphagia, aphonia, constipation and retention of urine, and in fatal cases interference with the cardiac and respiratory centers. There is practically no fever and no interference with the intellectual faculties. Paralysis is rare. Pathologically, degenerations of the anterior horn cells and the bulbar nuclei have been found. Gastro-intestinal symptoms are usually not present. In one epidemic eleven out of twenty-one persons died.

Dr. Fairbanks then cited a case of food poisoning in a family in which seven persons were affected with paralysis, loss of deep reflexes, loss of sensation and atrophy, mostly in the legs but also slightly in the arms. The origin of these cases of polyneuritis was traced to some food kept in an ice-box, which also became infected. In one case the symptoms lasted as long as fourteen months. The gastro-intestinal upsets were slight. The exact toxin in this case was not known.

Dr. E. W. Taylor said he had had no experience in poisoning of this kind. On the afternoon of the meeting he examined a ruddy young man who suspected that he had been poisoned by ice cream two years ago. At the time he was dizzy, slightly upset and constipated. This was followed by numbness and paralysis of the legs, which increased for about two months and has remained stationary, except for the last few weeks, when the patient thinks the trouble is again increasing. Clinically, the patient presents a myelitis with a sharply marked-off line of sensation, spasticity, a Babinski, etc. There is no involvement of the arms or cranial nerves. Has Dr. Fairbanks ever seen myelitis as a result of poisoning?

Dr. W. B. Swift asked whether the reader had found among his intellectual ramblings in this somewhat new field any cause or hint of one for multiple sclerosis, or any answer to the questions as to why some cases of pyrochætosia develop tabes, others paresis, and some both.

Dr. Adler said E. S. Faust has separated in crystalline form the two parts of the toxin of botulinus. Both were soluble in alcohol and were very resistant to heat. One gave the gastro-intestinal symptoms and the other the nervous symptoms. Their effect was something like that of atropine and curare. This is the first time a poison has been separated in crystalline form which has stood the test of time.

Dr. Fairbanks, in answer to Dr. Taylor's question, said that the usual bacteria found in ice cream are *B. enteritidis* and *B. paratyphosus*. He thought that his case was a coincidence and not one of poisoning. There is no record that shows that these bacilli produce paralysis. *B. botulinus* can not grow in ice cream. Dr. Fairbanks also said that he had found no evidence to answer Dr. Swift's questions. Dr. Fairbanks said that he had not seen the observations to which Dr. Adler alluded.

MARCH 16, 1916

The President, DR. EDWARD B. LANE, in the Chair

SUCCESSFUL PREGNANCY IN A GENERAL PARETIC

By Harry C. Solomon, M.D.

Pregnancy in a general paretic is uncommon. On the other hand, it is not uncommon for a male paretic to become the father of healthy children. He had two such cases under observation at the present time in which at the time of conception the men were suffering from general paresis.

The subject of this communication was a woman of thirty-eight years of age, whose first child had died within the first few months after birth with spinal deformity. This was followed by two miscarriages. She first showed symptoms of general paresis in February, 1913. After a slight remission, symptoms again appeared in November, 1914, and from that time on she grew progressively worse, until she entered the Psychopathic Hospital on January 1, 1915.

On physical examination it was found that her pupils were irregular and reacted sluggishly to light, that her blood Wassermann was positive, and that her spinal fluid gave a positive Wassermann and showed the other characteristics of general paresis. Under two months of antisppecific treatment she was so much improved mentally that she was allowed to leave the hospital. Her blood and spinal fluid Wassermann were both positive at this time. In September, 1915, she gave birth to an apparently normal, full-term girl, whose blood Wassermann was negative. The patient up to date has remained in good health.

Dr. Knapp recalled one case of conjugal paresis, in which the husband and wife showed marked signs. The wife later became pregnant and was a patient at the McLean Hospital and was delivered there. He did not know the fate of the child, but he knew that both the father and the mother had paresis. If the child was healthy, it would seem to be a case like the one Dr. Solomon has reported. We know that a certain portion of syphilitics after ten to fifteen years can have healthy children.

FOUR MENTAL CASES OF OVER SEVEN YEARS' DURATION WITH RECOVERIES

By Arthur H. Ruggles, M.D.

The four cases were all women over thirty-three years of age, with periods of confinement from seven and a half to ten years, and each termi-

nated in recovery. The two important points were, first, the correctness of the diagnoses; and second, that the cases all seemed to have the earmarks of chronicity.

CASE 1.—E. B., aged 40, single; entered the hospital in October, 1906, and was discharged in July, 1914. Of the four cases, this is the most recently discharged. She has been normal since discharge and is now managing a large estate. Her heredity was bad, her mother, two maternal aunts, and one maternal uncle being insane. Her brother was an alcoholic and killed himself. Her illness began in 1903, after the death of her brother. She attempted suicide a number of times. Her diagnosis on entrance was psychasthenia. She had to be tube-fed, was untidy, thought herself a headless monster, etc. Her condition began to improve in 1913, and in July, 1914, she left the hospital with a nurse. She was seen in October, 1915, and appeared normal. In December, 1915, her guardian was set aside by the court.

CASE 2.—E. R., aged 47, single, was a patient at the hospital from November, 1905, to September, 1913. Her diagnosis on entrance was psychasthenia. She presented many similar symptoms to Case 1. Was mute for three years, had to be tube-fed nearly a year. In 1911 she began to improve and gained steadily until discharge. She returned to work as a music teacher, going south in the winter and teaching in the north in the summer.

CASE 3.—M. M., aged 33, single; in hospital from March, 1900, to September, 1907. Entered with a diagnosis of melancholia; tube-fed for some time; showed marked fixed attitudes and stereotypism. In 1907 she was treated with thyroid and ultimately recovered absolutely.

CASE 4.—H. C., aged 38, married; in hospital from January, 1892, to October, 1902. Family history and physical examination negative. Was depressed one month before admission. She was much depressed but with periods of agitation while in the hospital. In 1900 she began to improve and left with a nurse in 1902. For a few years was slightly over-active in charity work. Later made a trustee on the board of a state hospital. An operation for cancer was done in 1910, and she died two years later, being absolutely well, mentally, up to her death.

Dr. Dewey recalled one case at the McLean Hospital. Driven by delusions the man had killed two members of his family and had remained in a condition of deep depression for some twenty years, scarcely speaking to any one and only as he was obliged to. He then began to improve, gradually coming out of his depression and making a most excellent recovery. When he was discharged his case had to be considered separately in the table giving the duration of insanity.

Dr. Lane said that one case at McLean, after seven years' residence, suddenly made a very rapid recovery. He did not know if the patient remained well.

THE VEGETATIVE SYSTEM AND INTERNAL SECRETIONS

By Frederic J. Farnell, M.D., Providence, R. I.

The speaker tried to link up some disorders of nervous origin with a condition clearly defined by Eppinger and Hess as vagotonia. Sir Granger Stewart's classification of constitutions and diatheses falls closely within the groups of so-called vagotonics. His classification is as follows: (1) a nervous constitution; (2) the lymphatic constitution; (3) the sanguinous constitution; (4) the bilious constitution. A mixture of "lymphatic," "nervous," and "bilious" constitutions yields very plainly the "vagotonic disposition."

These people appear for advice because of some rather slight ailment, "indigestion," "constipation," or a fear of high blood pressure, symptoms heretofore called "neurasthenic." The emotional life of these individuals is a most important factor in enhancing visceral symptoms. These patients have a weak, affective tone, and do not respond or adjust themselves to the difficulties of everyday life. When these unavoidable experiences occur, one must expect a profound visceral reaction, the type depending upon the system sensitized.

Dr. Farnell then described the visceral nervous system as noted by Eppinger and Langley. The following case was cited to illustrate the interactions and decidedly complicated mechanism involved by the chromaffin system and the visceral nervous system.

H. C., a boy fifteen years of age, whose family presents little of pathological importance except a brother, who is a cretin. The patient was full-term, labor hard, and delivery instrumental. He was recognized as a fine baby and weighed twelve pounds. There was nothing abnormal noticed in him; he walked at fourteen months, and talked at about the same time. He had no convulsions of infancy. He appeared to develop normally until four years of age, when he suddenly stopped growing physically and mentally. He did not grow fat. He would not play, was cranky and irritable as well as stubborn; wanted to be by himself. Complained of headaches and something (a numbness) in his legs. He wet the bed regularly. He was costive, talked in his sleep, and had nightmare. Had dreamy spells. At the age of five he was diagnosed a cretin. He was placed on thyroid gland, but immediately, even in small doses, he became sick, nauseated, etc. The drug was given only at intervals. The next five years showed extremely slow development. When seen four and a half years ago by the writer, he was in much the same condition as described, and was thought to be a case of pancreatic infantilism (Herter). He was given fifteen grains of pancreatin three times a day, and soon showed a clearing of symptoms. He continued to improve up to about half a year ago, when he developed frontal headache, periodical blushing and pallor of the skin of face, syncopal attacks, weakness and fatigue. For four months the patient has taken in addition to pancreatin three grains of suprarenal extract, with marked improvement. It is noteworthy that in the symptoms in this case there was an inhibition of the sympathetic and no definite stimulation of the autonomic.

Results with thyroid and pancreatin in school children with hypoplasias of the lymphatic system have been very good. In hyperthyroidism, both the sympathetic and autonomic systems are involved. It is a symptom of hypersensibility of the sympathetic nerve or an irritability of the autonomic nerve. The clinical stages are: (1) autonomic irritability; (2) sympathetic irritability; and (3) the effects of a disordered vegetative function. Some yield quickly to atropine, probably vagotonics, some to cytotoxic serum—an anti-serum low in the iodine content.

Attempts have been made to connect mental states and psychic disorders with over-irritability of the vegetative nervous system. Can it not be that this system plays a most important part in adjustment and acts as a most essential stimulator into action. Attached to this reactivity is its power to influence and direct functional conditions, not evident under ordinary conditions but aroused when given the chance—constitutional tendencies, disorders of personality, susceptibility.

Dr. Ruggles said he had been much interested in Dr. Farnell's work and had followed it closely. He has reduced this very difficult and complex subject to a working basis. Disturbances due to a single gland we know pretty well. In some of these cases we know that single gland treatment is unavail-

ing. In the light of Dr. Farnell's work, we know now that the cases that did not do well were probably due to disorder of more than one gland. One who is interested cannot fail to recognize the importance of Cannon's work. The work of Eppinger and Hess on vagotonia is most important. Vagotonia seems to be a clear clinical entity. Dr. Ruggles had seen a number of cases with continued low blood pressure (80-90) and increased muscular and mental fatiguability. These cases seemed to be deficient in adrenal secretion and a few were benefited by appropriate treatment.

Translations

VEGETATIVE NEUROLOGY, THE ANATOMY, PHYSIOLOGY, PHARMODYNAMICS AND PATHOLOGY OF THE SYMPATHETIC AND AUTONOMIC SYSTEM

BY HEINRICH HIGIER

WARSAW

Authorized Translation by Walter Max Kraus, A.M., M.D.
[New York].

(Continued from page 568)

22. The midbrain as far as the corpora quadrigemina constitutes the general end station of the vegetative nervous system in the cranial region. Experimentally obtained facts gathered in recent years make it probable that the hypothalamus, *i. e.*, the region lying between the epiphysis and the hypophysis, contains synapses for the vegetative pathways.

Destruction of the corpora mamillaria causes polyuria (Eckhardt), of the thalamus, hyperthermia (Jung), of the lateral area of the gray matter on the floor of the midbrain, dilatation of the pupil and widening of the lid slit (Karplus-Kreidl). Stimulation of the ventricular floor in the region of the hypophysis brings about contraction of the bladder, the intestines and uterus (Frankl-Hochwart and Froelich), while stimulation of the tuber cinereum produces dyspnea and arrest of the heart's action, followed by bradycardia (Aschner). Lesions of the floor of the midbrain induce marked metabolic and trophic changes in young and adult animals (genital dysplasia of the ovaries and testes, retardation of growth) and puncture of the floor of the third ventricle causes intense glycosuria similar to the Claude Bernard puncture of the floor of the fourth ventricle (Aschner). Simultaneous section of the distal ends of the sympathetic (NN splanchnici) prevents the occurrence of this glycosuria of hypothalamic origin as well as any glycosuria which may be caused by stimulation proximal to the place of section. As will be emphasized later, this glycosuria is an adrenalin glycosuria and is accompanied by a marked reduction of the chromaffin substance of the adrenals.

This experimental evidence, as well as the clinical observations and the after effects of operations on tumors and hydrocephalus of the midbrain region, lead to the following conclusions. Vegetative nerve tracts controlling visceral activities extend into the brain as far up as the third ventricle. Trophic and metabolic disturbances which have hitherto been ascribed to dyspituitarism may also have their origin in a disturbance of the neighboring part of the brain, the hypothalamus. This possibly acts as a regulating center for glands of internal secretion and for the vasomotors of the brain.

23. The sensory innervation of the vegetative system is of great importance. This differs considerably from cutaneous sensation and follows different laws. Since its semiology has a wide bearing upon many problems, it will be discussed at some length.

It has become customary to speak of the vegetative system as purely motor, for the reason that the sensory fibers from the viscera pass into the cerebrospinal axis *via* a posterior root ganglion or what corresponds to it, the Gasserian ganglion.

What are the general relations of the sensory elements of the vegetative system and their relations to motor and secretory activity in particular? Most people, particularly if normal, never experience any sensation from the internal viscera. Others, particularly the neuropathic, learn by practice to recognize such sensations. Motor and secretory activity is never voluntary and is usually reflex, in response to some sensory stimulus. These stimuli, when they are carried to consciousness by the somatic nervous system, travel by the usual route. Examples are the sensation of light which contracts the pupil, stimulation of the conjunctiva with a flow of tears, stimulation of the glans penis with ejaculation, local application of heat with sweating, local application of cold with blanching, taste stimulation with salivation, stimulation of the mucous membrane of the bronchial tree with bronchospasm. If the primary stimulus causing the reflex comes from the vegetative nervous system, it remains unconscious. Examples are activity of the pharyngeal glands, stomach, intestine, gall-bladder and ureter.

When the sensory stimuli pass to consciousness they are converted into reflex stimuli in the gray matter of the spinal cord. When sensory stimuli *do not* pass to consciousness, the reflex is accomplished most probably in the organ or the neighborhood of the organ itself. The facts that normal peristalsis, secretion and digestion go on when all nerves to the intestine and stomach are cut, and the continuation of cardiac activity after the autonomic and

sympathetic supply is cut are evidences in favor of this hypothesis. When an organ acts periodically, the impulses of nervous origin recur quite regularly. L. Müller strengthens this idea as far as the intracardiac nervous system by saying that "there are many ganglion cells at the place at which the cardiac impulse is initiated, the sinus node, and at the place at which the impulse passes from the auricle to the ventricle, the node of Tawara."

The question whether the organs of the vegetative nervous system can produce sensory stimuli, stimuli which may become conscious and particularly stimuli of pain, has been discussed in the fields of both physiology and pathology for many years. As early as the seventeenth, eighteenth and nineteenth centuries, Harvey, Albert von Haller and Weber maintained on the basis of their experiments that internal organs, particularly the heart and intestines, were unreactive as far as sensation was concerned.

In the last decade, Lennander, Wilms and others, in several contributions concluded on the evidence obtained in laparotomies done under local anesthesia that the internal organs of the abdominal cavity have no sensory supply. It was thought that the results obtained by stimulating mechanically or chemically, that is, absence of pain, could be compared to the stimuli occurring under normal conditions. Lennander denied that there exists any sensation in either the intestine or the visceral peritoneum. He showed that the parietal peritoneum was supplied with pain fibers. The painlessness of many operative procedures upon the organs of the thoracic and abdominal cavities led Lennander's followers to conclude that no internal organs were sensitive to pain, while all parts in these cavities which are supplied by the spinal nerves, as the parietal peritoneum and pleura, were sensitive to pain.

Many facts pointed against Lennander's contention, such as sensitiveness to pain on pressure upon an inflamed organ, severe tabetic gastric crises, enteralgias of other nervous diseases. The simplest explanation of these contradictory facts is offered by Lewandowsky. He maintained that the normal daily stimuli from the always active organs reached the spinal cord *via* the posterior ganglia. Such stimuli include the centripetal impulses of osmosis, diffusion, capillarity, filtration, movement of blood and lymph, variations in surface tension, chemical molecular intraorganic processes, etc. These stimuli only pass cerebralward when the degree of stimulation passes a certain level. Then they become painful stimuli as colic, cardiac pain, the pain resulting from transient anemia and hyperemia of organs and the nerves supplying them. Analogo-

gously, we do not feel the continual rubbing of our clothes on our body, the temperature about us, if it be not of extreme grade, taste in our mouths if it be not extreme, the contractions of our muscles if they be not cramplike.

From our present knowledge, we must conclude that the skin and the visible and external mucous membranes are more sensitive and are better equipped to react to external noxæ and variations of all kinds than the internal organs of the body.

One thing must not be forgotten in drawing conclusions from animal experimentation, namely that extra-physiological inadequate or extreme stimuli are used to test cardiac or intestinal sensation as incisions, electric currents, great heat or strong acids. Internal organs have sensations peculiar to themselves, a specific sensibility. This, like external structures whose nerve supply differs with their peculiar needs, is adequate to the needs of the organs, but different from that of external organs and can by no means be measured by the same standards. For example, Zimmermann found that the esophagus, stomach, ureters and bladder were sensitive to changes in pressure, a warning mechanism, no doubt. Yet, heat, cold and irritation aroused no reaction, no sensory fibers existed for these stimuli.

Some investigators as Mackenzie and Head assume the existence of centripetal fibers from organs to spinal cord. On this basis, a middle position between no sensation at all and a specific sensation is taken. This school believes that the fibers from organs to spinal cord do not pass directly to the cortex, but that they first go to the spinal cord and from there the sensation may be relayed to the cortex. This theory has become extremely popular. It accounts for reflex pains occurring in visceral disease, pains which are often not felt in the organs themselves, or not only in them, but are also very definitely localized in some skin area. This area corresponds to the spinal cord segment which receives the nerve fibers from the organ involved. There is no doubt of the existence of these hyperalgesic areas of Head, the only doubtful element being the explanation of the entire mechanism of their occurrence. They were described by others before Head, Bassereau (1847), Beau (1866) and Lange. The English authors believed the occurrence of these hyperalgesic areas to be due to the passage of abnormally strong stimuli from the organs to the spinal cord, thus making the sensory fibers there much more sensitive. From this, the corresponding skin areas became over-sensitive or hyperalgesic.

The conclusion from these last mentioned facts is as follows:

There are fibers passing from internal organs *via* the posterior ganglia to the spinal cord which do not give any definite sensation but are sensory in nature and are not to be confused with any vegetative fibers passing to the organs. These fibers are activated by abnormally strong stimuli. It is noteworthy that the Head zones are never as sensitive when the pain stimulus comes merely from the spinal cord fibers, as when they come from some stimulation of the cerebrospinal axis impulses from vegetative organs.

Newmann attempted to discover the localization of painful sensations by experimental methods. He used various means, pinching, striking with fine hot rods, faradization, painting with acetic acid. He applied these various stimuli to all parts of the mesentery, suspensory ligaments and parietal coverings of the internal organs of the frog. Some experiments were tried on dogs. He found all organs but the spleen and kidneys sensitive, giving a reaction a definite time after the abdomen was opened. The reaction consisted in powerful reflex movements of the hind legs and the posterior girdle muscles. Newmann states that the sensory fibers for the thoracic cavity pass in the vagus nerve while those for the abdomen pass in the splanchnic nerves. This is shown by the cessation of reflex movements when these nerves are cut. The intestine, moreover, has a mechanism by which stimuli are passed cerebralward *along* even though the mesentery with its centripetal nerves is separated from the intestine. This Newmann speaks of as transference of stimuli *along* the intestines, *i. e.*, to *other* segments and *then* centralward.

The intestinal wall is composed, going from outward in, of the following layers, longitudinal muscle, Auerbach's plexus, circular muscle and Meissner's plexus. Newmann states that sensation is lost when Auerbach's plexus is destroyed and that intestinal sensation, *i. e.*, the sensory endings of the vegetative reside in it. Whether this sensory function in man is part of the autonomic or sympathetic systems has not as yet been discovered.

L. Müller came to the following conclusions from his work upon the vagus: (1) The contention of Lennander and Wilms that the intestine can give no sensory stimuli without the intervention of the nerve fibers going to the cerebrospinal system from the parietal peritoneum must be definitely abandoned. (2) There is no definite basis for assuming the existence of sensory fibers in the vagus. Since stimulation of the splanchnic nerves causes pain sensations and reflex movements of considerable intensity, these nerves must be considered as sensory in part. The sensory fibers

have, as Langley believes, their trophic center in the posterior root ganglia and pass *via* these to the spinal cord.

Normal tactile and chemical stimuli are limited in their effect upon the intestinal wall in that they only provoke motor and secretory reactions. Only under abnormal conditions do sensory stimuli pass to the cerebrospinal axis. If the abdominal wall be stretched (meteorism), the activity of the intestines be obstructed, colicky movements occur like leg cramps, if the blood supply of the intestines be obstructed (embolism of the mesenteric artery) causing a condition similar to the vasomotor spasm of angina pectoris or the intermittent claudication occurring in the extremities, then severe pain sensations begin. The pains produced are more severe than those produced by simple stimulation of spinal nerves. These sensations are frequently accompanied by signs of abnormal activity in other parts of the vegetative nervous system, as for example, salivation, sweating, pallor of the face, raising of blood pressure.

Severe intestinal pain of purely nervous nature sometimes comes spontaneously (splanchnic neuralgia), the basis being either an intoxication, as lead, or syphilis (tabetic intestinal crises). Rare exceptions are severe intestinal pains without increased peristalsis (lead) and much increased peristalsis without pain (animals all of whose abdominal nervous system has been removed except the sympathetic). Not only under normal but also under abnormal conditions mild stretching feelings are felt in the intestinal tract, especially in the rectum. These lead to active emptying either from above or below.

Sensation in the intestine has according to Müller the same function as sensation in the outer coverings of the body, namely to act as a register of some disturbance and as a protector of the organism against harm. The severe pains lead to rest and sparing of the affected organ. It is interesting to note that intense emotions also have a quieting effect upon the intestine. "The splanchnic," says Müller in concluding, "has the function of transmitting sensations from the intestinal tract to the brain when the former is disturbed and of transmitting sensations from the brain to the ganglia of the intestines when the normal activity of the former is lessened due to fear or anxiety or pain. The splanchnic nerves are therefore the mediators between the activities of the brain and the intestines and carry signs of danger in one to the other.

Froehlich and Meyer on the basis of very exact experimental work have come recently to conclusions somewhat different than

Müller's. They tested the pain-bearing paths from the intestines and bladder of dogs. They used a faradic double electrode, a rubber balloon and a 5 per cent. solution of barium chlorid which would cause marked colicky intestinal contractions. They relied upon loud cries and escape movements as a test of the pain. By various transections of the lower spinal cord and removal of posterior roots they were able to show that sensation in the bladder except in the sphincter region was *not* carried by the sympathetic hypogastric nerve or the spinal nerves (NN. pudendi and N. hemorrhoidalis post.) but exclusively by the autonomic pelvic nerve. This last sends pain fibers upward to the brain through the sacral spinal roots.

(To be continued)

Book Reviews

KURZER LEITFADEN DER PSYCHIATRIE. Dr. P. Jolly. A. Marcus & E. Weber, Bonn. Mk. 4.

The son of Prof. Jolly, of Berlin, treads in the footsteps of his father, to whom he dedicates this small volume, while assistant to Prof. Anton in Halle.

The usual divisions into general psychiatry and special psychiatry are followed and the work is an excellent compromise between the larger hand-books and the smaller compends.

We commend the volume and wish it success.

TRATTATO DI PSICHIATRIA. Del Prof. Leonardo Bianchi. Seconda edizione, rinnovata. Casa Editrice. Dott. v. Pasquale. Napoli.

The first edition of Bianchi's treatise on psychiatry was received with such signal favor that it found an English translator and publisher, and in this dress has become well known to many of our readers.

We welcome this second edition in which a number of alterations appear, due to the rapid changes in viewpoint in the psychiatric field; one in which individualistic trends have had the widest of latitudes. Bianchi's sympathies have always reflected his pedagogic trends and here he is a master.

We can only reëcho the wish, so quickly realized when it was put forth in the review of the first edition, that a second edition in English may appear.

JELLIFFE.

THE DUCTLESS GLANDULAR DISEASES. By Wilhelm Falta, Vienna. Translated by Milton K. Meyers, of Philadelphia. P. Blakiston's Son & Co., 1915. \$7.00.

We have commented on the German original of this work, considering it the most important of the recent contributions to medical science, in the field of vegetative neurology. Although it is questionable whether Falta is willing to consider all of the endocrinopathies as belonging to this domain, yet his understanding of the whole problem is so broad and his treatment of it so penetrating that we feel as though it were written as much from the standpoint of the vegetative nervous system as from that of the hormone hypothesis.

We now possess three important and separate German discussions of this domain: Biedl, Vol. V of Lewandowsky's Handbuch and Falta. The greatest of these is Falta's.

This is a book that can be recommended without reservation to our readers, not only because of the importance of its subject matter, but by reason of the masterly handling of the same. We can only hope that a second edition will be demanded to eliminate crudities in an otherwise well-done translation. The translator is to be congratulated on having accomplished really a phenomenal task in the time since the German original appeared.

JELLIFFE.

DIE NERVENKRANKHEITEN DES KINDESALTERS. Von Dr. Georg Peritz. Fischer's Verlag. H. Kornfeld, Berlin.

This is a thoroughly well written book, dealing not with all of the disorders which children may show in nervous pathology, but those which are

more characteristic of children or are influenced particularly by this period in the life of the human being.

It therefore has been permitted the author to depart from the more usual principles of arrangement, to construct one for himself. This he has done largely on principles of localization.

His opening chapters are on the infantile or child nervous system and on symptomatology. He then takes up Infantile Cerebral Palsies, Familial and Congenital Disorders, the Inflammatory Disorders of the Nervous System, the Neuroses, Endocrinopathies and the Congenital Defect States.

JELLIFFE.

LA BIOCHIMIE DEL CERVELLO. Dr. Giacomo Pighini. Rosenberg and Sellier, Turin.

Dr. Pighini, privat docent of neurology and psychiatry in the University of Parma, here presents a series of five lectures delivered before the Clinical Institute of Milan on the biological chemistry of the brain. These lectures discuss the form and physico-chemical constitution of the neural elements, the chemical constitution of the healthy brain, the histochemistry and pathological chemistry of the brain, nervous energy and the physical chemistry of protoplasm and the gaseous exchange of the central nervous system, narcosis and sleep. It is all done in 150 small pages and well done, and although there is nothing at all new, yet it gives an excellent short summary of the present-day knowledge concerning cerebral chemistry.

JELLIFFE.

KLINIK DER NERVENKRANKHEITEN. Ein Lehrbuch für Aerzte und Studierende. Von Dr. Leo Jacobsohn. August Hirschwald, Berlin. 19 marks.

Dr. Jacobsohn has written a practical book, especially valuable by reason of its many illustrations and clinical character. Anatomy and pathology have been put in the background to allow for a greater prominence of clinical material.

In the main the older lines of demarcation are followed. The descriptive matter is written about a rich illustrative selection of striking cases.

JELLIFFE.

EPIDEMIC INFANTILE PARALYSIS (HEINE-MEDIN DISEASE). Paul H. Römer, Marburg. Translated by H. Ridley Prentice, London. William Wood & Co., New York.

Römer's work is based upon a very careful study of an epidemic in northern Germany, which may be considered as an extension of the Swedish epidemic which gave rise to the work of Wickman and others.

Müller and Römer, working in concert, made a thorough investigation of this Hesse-Nassau epidemic. The former author has contributed a careful clinical study, while Römer in the work, which lies in excellent English dress before us, has taken up the pathological, epidemiological and animal experimentation sides of the problem.

The present work constitutes by far the fullest and most intensive of the more recent work in this field, and as it is a side which has been neglected in many studies, this work will prove of great value.

In our review of the German original of this work (Vol. 39, p. 499) we have outlined the chief features of the book, but we desire to add here, although our review of this excellent translation is somewhat belated, that this is an essential work to the neurologist and represents one of the most careful and valuable studies of the recent period which has added so much to our knowledge of polioencephalomyelitis.

JELLIFFE.

TABETIC OCULAR CRISES. W. J. Spiller. (*Journal A. M. A.*, March 18, 1916.)

Spiller, after giving brief synopses of the cases reported by Pel, Haskovec, and Knauer, reports a personal observation of ocular crises in typical tabes which is peculiar in presenting visual symptoms ranging from flashes of light to conscious hallucinations of individuals, houses, animals and reptiles. There were no mental symptoms and the patient realized perfectly that the visions had no real basis. There was no evidence of cortical irritation, and while the phenomena suggest the scotomas and visual disturbances in certain cases of migraine and epilepsy, they cannot be identified with them. The lacrimation and pain are probably due in this case as in the others to fifth nerve irritation, which also seems to exist in this patient as regards the optic nerves. Spiller refers to the fact that he has previously observed and made notes of visual hallucinations due to retinal hemorrhage and irritation of various portions of the visual tracts.

EFFECT OF LIGHT ON THE RETINA OF THE TORTOISE AND THE LIZARD. S. R. Detwiler. (*Jour. of Exper. Zoology*, Vol. 20, No. 2, 1916.)

Three effects of light upon the retina discovered through investigations with various animals are, the author says, of particular interest. (1) Migration of the pigment in the epithelial cells of the retina. (2) Changes in form and position of the visual cells. (3) Changes in form, position and ability to stain of the ganglion cells and of the nuclei of the inner and outer granular layers. He devotes his study to these phenomena in regard to the reptiles, with which no definite results of investigation have yet been obtained. His experiments were therefore undertaken with three American species of tortoise and one of lizards. Morphologically it seems confirmed that cones are the principal visual element of tortoises and of lizards. Rods are very rare, and entirely absent in the species under discussion. The cones are of two kinds, the single cone, which is the more numerous, and the double cone, the single cone showing different varieties. Experiment shows a distinct pigment migration and a contraction of the cones in light, together with a flattening of the pigment epithelial cells. In regard to the third effect experiments bore out the results of work upon other animals. The cone nuclei were in general lengthened and narrowed and the stainability of the ganglion cells was rendered less dark and more diffuse by a diminution of chromatin and Nissl substance. Further investigation was carried on with eyes in which the optic nerve had been cut. There resulted a forward migration of the pigment in the light eye with a practically normal contraction of the cones. In the dark eyes, however, while the pigment was as far forward as in the light eye, the cones were stretched maximally. Electric stimulation of the enucleated bulbus with a moderate induced current produces besides a forward migration also a bunching and massing of the pigment. There is also a slight broadening and contraction of the cones. A constant current of 15 to 20 M. A. through the eye for fifteen minutes also produces migration of pigment with, moreover, a broadening and stretching of the cones. Detwiler quotes Garten's theory in explanation of these phenomena. He says that the optical isolation of the visual elements by the pigment migrating forward prevents the dispersion of light in all directions through the ellipsoids present in certain forms or the oil drops in others. Internal reflection due to the presence of rods prevents this, also, but in a pure cone retina the pigment must migrate forward and cover the oil drops. Both the pigment cell and the cone are sensitive to direct light as the experiments upon the eye with the severed optic nerve reveal. The effect of light is probably bound up with chemical stimulus brought about by a metabolic product set free through the influence of light, the process being similar to that occurring with the melanophores of the skin.

JELLIFFE.

Notes and News

Obituaries

BROOKS FORD BEEBE, A.M., M.D.,

1850-1914

Brooks Ford Beebe was born June 25, 1850, at Barlow, Washington County, Ohio, and died at Cincinnati, May 29, 1914. The final summons came suddenly, due to a cerebral hemorrhage while actively engaged in professional duties.

The study of medicine was a family heritage, his father and grandfather having been practitioners of medicine, while he himself was one of three brothers also physicians. His father was William Beebe, officer and surgeon of the 148 Regiment O. V. I., and a member of The Loyal Legion, to which the subject of this memorial was elected a "Member of the First Class by Inheritance" in 1906. Insignia No. 14989.

Dr. Beebe's boyhood was spent in rural or semi-rural districts, where he obtained the usual primary schooling of those days.

Coming to Cincinnati in the later '70's, he matriculated at The Medical College of Ohio—now medical department of The University of Cincinnati—where he graduated with honor in 1880, securing as one of the rewards of good work, an internship in The Hospital of the Good Samaritan. After a year of honorable and distinguished service here, he entered upon a career in private practice, hospital and college work which brought him success and reputation as a practitioner and teacher.

For nine years (1881-90) he was acting assistant surgeon to The U. S. Marine Hospital, at Cincinnati. Shortly after entering private practice (in 1890) he developed a taste for medico-legal work, especially in connection with psychiatry, and his services were in frequent demand by the courts and the legal profession. For a number of years he taught the subject of physical diagnosis to the students of his alma mater. He was also at one time assistant to the chair of physiology, then occupied by the late Dr. Frederick Forchheimer.

In 1900 he established the private sanitarium for nervous and mental disorders, known as "Grandview," located on Glenway



BROOKS FORD BEEBE, M.D

Avenue, Price Hill, Cincinnati. He was its medical superintendent and proprietor at the time of his decease. His wide acquaintance and personal popularity with the medical profession brought him cordial support.

As a member of the faculty of The College of Medicine, University of Cincinnati, he was, for a term of years, the writer's colleague, and our personal and professional relations were of the most harmonious and agreeable character.

Active and cheerful in his attention to duty, he enjoyed in high degree the appreciation of his classes; and a wide circle of physicians and former students will miss his genial smile and cordial greeting.

While not a voluminous writer, his contributions to medical literature were timely and practical in character, and bore evidences of much thoughtful preparation.

Dr. Beebe married, in 1898, Mrs. Beulah Benton Hissem, of Kentucky, who survives him. She was his active and very efficient helpmate in the conduct of his sanitarium work and is gratefully remembered by the many patients whose welfare was promoted by her wise supervision and personal attentions.

Dr. Beebe took an active interest in organization and organizations—medical, fraternal and social; and held various positions of honor and responsibility in such bodies.

A member of The Academy of Medicine of Cincinnati from his earliest years in practice, he was subsequently influential in reorganizing The Ohio State Medical Association. As chairman of its council, he was a strong factor in building up the state medical organization into a compact and useful body. He was also chairman of its "Section on Nervous and Mental Disease" in 1909. He was president in 1907 of The Ohio Valley Medical Association.

Of national medical organizations, he was identified with the American Medical Association and was a member of The American Medico-Psychological Association from 1909 until his decease.

He was also a member of the Masonic Order, and a presidential elector in 1909.

Marietta College conferred upon him the degree of Master of Arts in 1905.

The writer of these lines enjoyed his confidence and personal friendship throughout his long and successful career as student, interne, practitioner, teacher and consultant; and it is with a feeling of personal loss that he assumes the sad duty of recording this tribute to his many good qualities.

By his untimely passing in the zenith of his career, the medical profession loses an industrious and able worker; his family a loving personality of marked distinction in his life's work; his intimate associates a warm and outspoken friend; and the community a useful citizen.

F. W. LANGDON

WILLIAM NOYES, M.D.

William Noyes died at his home at Jamaica Plains, Massachusetts, on October 20, 1915, at the age of fifty-eight. His life had been devoted to the service of psychiatry and neurology, in which field his proficiency was recognized in the appointment to various positions of opportunity and responsibility which had been his.

He graduated from Harvard in 1881 and from the Harvard Medical School in 1885. He then became fellow in psychology at Johns Hopkins and later studied also at Vienna and Berlin. His public service began with a brief period as resident physician at the Baltimore Lunacy Hospital, which was followed by the position of assistant physician at the Bloomingdale Asylum of New York. Later he was connected with the McLean Asylum at Somerville, Massachusetts, where he established a laboratory for special research in psychiatry and neurology. He served also as assistant physician at the Hospital for Dipso-maniacs and Inebriates at Foxboro, Massachusetts. In 1896 he was made superintendent of the men's department of the Boston Insane Hospital and afterward made head of the institution, in which capacity he served until 1910 when he resigned to enter private practice in Boston. He had also held the position of clinical instructor in the Harvard Medical School. He was moreover a member of the American Neurological Association and the Boston Society of Neurology and Psychiatry, as well as a fellow of the Massachusetts Medical Society.

A number of his publications have appeared in the American journals. "Paranoia—A Study of the Evolution of Systematized Delusions of Grandeur" was published in the American Journal of Psychology in May, 1888, and a second part of the paper in May, 1889. The same journal published in 1892 an article "On Certain Peculiarities of the Knee-Jerk in Sleep in a Case of Terminal Dementia." He also translated "Paranoia: Systematized Delusions and Mental Degenerations," by J. Séglas, which was printed in the JOURNAL OF NERVOUS AND MENTAL DISEASE in March, April, May



WILLIAM NOYES, M.D.



PROF. KARL HEILBRONNER, M.D.

(Photograph obtained from Prof. C. Winkler, of Utrecht.)

and June, 1888. This magazine also published in August, 1889, his "Clinical History and Autopsy of a Case of General Paresis of Nine Years' Duration." He contributed, moreover, the article on Paranoia in the American System of Practical Medicine (Loomis-Thompson) published by Lea Brothers & Co., Philadelphia. His critical reviews were published also in the American Journal of Psychology and other periodicals.

After his retirement from hospital life, at the request of the State Board of Insanity, he made a careful investigation and census of the feeble-minded living outside of institutions in Massachusetts, and wrote a valuable report, which unfortunately has not been published.

Dr. Noyes was an able man, of good judgment, and a deep student in his chosen profession. He was modest, sensitive, a man of warm friendships, and domestic in his tastes.

In 1894 he married Lucia Clapp, of Montague, Massachusetts, who survives him with two sons, now students in Harvard College.

PROF. DR. KARL HEILBRONNER.

The death of Karl Heilbronner at Utrecht in September, 1914, brought a distinct sense of loss to his colleagues in Holland as well as in his native Germany, which extended also to the psychiatric and neurological world at large. Though but forty-four years of age, he had set his mark upon this branch of medical knowledge and practice both through the character and the extent of his work.

He was born in Nürnberg and studied at München under Grashey. He was later the pupil of Wernicke and Meynert at Breslau. This association with Wernicke marked the beginning of the first of the three chief epochs of his life. He continued with him for five years as his assistant and began there the literary activity in which he was always very productive.

The next period of his activity found him as head physician of the Hitzig clinic at Halle, from which position he was called in 1903 to succeed Ziehen as professor of psychiatry and nervous diseases at the University of Utrecht. Here he continued actively until his death.

He was greatly influenced by both Wernicke and Hitzig, who contributed much to his development. Yet he went his own way independently and built up his own place until he stood among the first in his specialty. His method of work owed much to the influ-

ence of Wernicke, though Heilbronner freed himself especially from the latter's somewhat elaborate conceptions and adopted a more limited view in the localization theory.

His work at Utrecht gave him opportunity to observe and use modern methods in theory and practice in the care of the mentally diseased, while his talent in clinical research and ability to present results contributed much to the high character of the institution.

He manifested a hospitality and sincerity of friendship which gave him a lasting place among his circle of friends. He was however a reserved, prudent man, somewhat suspicious and lacking the joy of existence, which prevented a wider development of his social life. His chief recreation was at the piano, at which he was a master. He was however always ready to undertake any service and brought to his work the industry, power of application, penetrating knowledge and keenness of judgment, which were his marked characteristics. These together with his quiet clear manner of speaking won for him respectful attention in scientific circles. His negative qualities manifested themselves in his work in that he was not an innovator, but rather almost a doubter in his conservatism. But though he did not seek out fundamentals he built well the superstructure through his keen critical sense and breadth of actual knowledge and wide outlook.

His interest embraced the purely neurological as well as the psychiatric. He was particularly concerned with the connection of the physical side of brain disease and the mental symptomatology in dementia and other forms of the psychoses, and he built up his knowledge from his skill in clinical observation and from careful anatomical work. The histology of multiple neuritis and the pathological anatomy of the so-called functional psychoses both owe much to his researches. He contributed also to the knowledge of recurring light attacks and of "fugues." Perhaps his chief published contributions are those dealing with the theory of aphasia and its allied disorders. He has published extensively in psychiatry, including some comprehensive work on the psychoneuroses, and in the strictly neurological field. He showed marked forensic ability and had worked moreover on the social side of psychiatry. His writings were the excellent result of his careful clinical and anatomical observation and judicious thought combined with his special skill in presentation.

He was invited, together with Bleuler, to the opening of the Phipps Institute at Johns Hopkins as one of Europe's most celebrated psychiatrists.

The Journal OF Nervous and Mental Disease

An American Monthly Journal of Neurology and Psychiatry, Founded in 1874

Original Articles

INTRAMEDULLARY TUMOR OF CERVICAL CORD. DIAGNOSIS. REMOVAL IN TWO-STAGE OPERATION; GRADUAL IMPROVEMENT*

BY F. N. DERCUM, M.D., AND J. CHALMERS DA COSTA, M.D.

The case which we herewith place on record is interesting and important from several points of view. Especially has it to do with the recognition and interpretation of pain of spinal origin. The significance of such pain is frequently overlooked, especially when it is slight in character or ill defined. At times too it is incorrectly ascribed to a visceral origin and under such circumstances has led, as we all know, to futile abdominal and other operations. Again even when the pain is suspected of being spinal in origin the descriptions by the patient both of its character and distribution may be so vague as to render its interpretation exceedingly difficult. Secondly the case we have to report is interesting because of the relatively rapid and extensive development of symptoms suggesting a diffuse affection of the cord, such as a myelitis, rather than a local lesion. Further, the case is interesting because of the serological findings; and finally because of the diagnosis of tumor and the successful localization and removal of the latter.

Briefly the case is as follows: J. Y., aged twenty-five, single, white, native, and a hotel keeper by occupation, was admitted to the Jefferson Hospital on January 27, 1916. The chief symptom complained of was paralysis of both legs.

* Read by title at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

The family history was without significance. Father died of heart disease in middle life; mother, three brothers and three sisters living and well. There is no history of cancer or tuberculosis.

The personal history revealed of the childhood diseases merely chicken-pox. The patient had never had pneumonia, typhoid fever, malaria, influenza, rheumatic fever or tonsilitis. He had had gonorrhea twice, once when seventeen years of age and again at twenty-one. He denied luetic infection. Admitted that he used both beer and tobacco freely. Had never had an accident of consequence.

The first symptoms of his present illness appeared in the latter part of October, 1915. He noticed at that time some pain or numbness vague in character in the left shoulder. The shoulder did not hurt him when it was moved or handled; however, numbness gradually made its appearance in the left arm and a little later still, distinct weakness of the left arm. The patient also states that if he coughed or jarred himself in any way he had a sensation as of a "thrill going through his body." Soon numbness with pain made its appearance in the right arm as well and this also was accompanied by weakness. The pain was at no time severe in either arm or shoulder. It was the feeling of numbness of which the patient especially complained. Soon he experienced a feeling of weight, pressure or hardness over the abdomen and in about one month after the initial symptoms had made their appearance, he experienced weakness in both legs. Walking became difficult and soon there was loss of sensation and paralysis in both legs. Bladder difficulties, retention of urine and later incontinence also made their appearance.

When admitted to the Jefferson Hospital, he was completely paraplegic and there was absolute loss of sensation to all forms as far as the level of the second rib. There was incontinence of both bladder and bowels and a large bed-sore over the buttocks.

A patellar reflex was elicited upon both sides; it was perhaps a trifle plus. There was no ankle clonus. There was, however, a Babinski sign upon both sides.

Both arms were weak. Movements were best preserved at the shoulders and in the upper arms. There was marked weakness of both forearms and hands. The hands assumed the position of wrist drop especially the left; the wrists, however, could be extended at will, though there was inability to properly extend the fingers. There was marked general wasting of the hands, forearms, arms and shoulders, as well as of the trunk and of the lower extremities. The lumbricales, both the thenar and hypothenar eminences and to a smaller extent the interossei were wasted in the left hand. Similar changes were noted in the right hand, though they were less marked; the lumbricales seemed in a large measure to have escaped. Hypesthesia to all forms of sensation, but very moderate in degree, was present in both hands and arms and disappeared when the shoulders or neck were tested. The pains which had been noted in the beginning of the case were at the time of admission to the hospital no longer present, merely a sense of numbness in the

shoulders and arms. Both legs and the entire trunk were anesthetic to all forms of sensation up to a line about midway between the first and second ribs. Here the anesthesia passed through a narrow intervening band of hypesthesia to fully preserved sensation. An area of hyperesthesia was not present.

There was no involvement of the muscles of the neck, head or face. The pupils were equal, average in size and reaction to light. The tongue was protruded in the median line.

The general visceral examination was negative, except that the first sound of the heart was slightly roughened. There was also a slight purulent discharge from the penis. An examination of the urine revealed a trace of albumen and a few pus cells.

A Wassermann examination of the blood proved negative. The spinal fluid revealed no unusual pressure. It also proved negative to Wassermann; it, however, contained 21 lymphocytes to the c.mm., revealed a marked globulin content and reduced Fehling. Finally it was rather striking in the fact that it was pale yellow in color. It may be stated incidentally that a test for bile salts proved negative. A culture of the spinal fluid also yielded a negative result.

Urethral smears revealed many pus cells, a few pneumococci and an occasional gram negative intracellular diplococcus.

A von Pirquet test proved negative.

The patient was repeatedly examined and but little change was noted in the symptoms subsequently save that some two weeks later the pupils were found to be somewhat unequal the left being larger than the right. An ankle clonus also appeared upon the left side.

An examination of the eyes by Dr. William M. Sweet revealed the right pupil to be 3 mm., the left $3\frac{1}{2}$ mm. Both reacted to light and convergence. The eye grounds were normal save that the veins were rather full and somewhat tortuous in the left.

An X-ray examination of the cervical and dorsal vertebrae was negative.

Save for the history of the initial pains in the shoulder, the case, to casual observation, might have suggested a diffuse myelitis, but the diagnosis of tumor of the cord, probably intramedullary, was deemed justified. Dr. J. Chalmers Da Costa, who was now consulted, concurred, and an exploratory operation was recommended. The patient's general condition was very bad; he was weak and emaciated and it was some time before his consent or that of his relatives could be secured. Finally on February 21, 1916, the operation was undertaken.

An incision was made over the fourth, fifth, sixth, seventh cervical and first dorsal vertebrae and the processes and laminae of the seventh cervical and first dorsal vertebrae removed. On opening the dura very little fluid escaped and there was no pulsation. The dura and subjacent pia seemed to be adherent. When the dura was removed several small white patches suggesting tubercles were noted on the surface of the cord. The cord which did not present an appearance of distention—at least not markedly so—was then incised. The incision which was at first very minute was of course longitudinal in direction and made on the left side of the cord over

the median lateral column, less than an eighth of an inch from the longitudinal fissure. Immediately a dark, bluish-red mass began to extrude. The incision was gently enlarged until it was about an inch in length. The mass, which seemed to be smooth and soft, continued to extrude. It seemed to be detaching itself without apparent injury to the columns of the cord. It was evident that dissection would damage the cord and it was decided to follow Elsberg's plan. Oozing rendered the use of gauze necessary. So small pieces of iodoform gauze having been paced lightly about the cord, the skin edges of the wound were closed and the patient returned to his room in very good condition.

He reacted well from the operation and, save for pain in and about the site of the operation, was very comfortable. His case progressed without incident save that some three days later he believed that he could tell which foot was being touched. Five days later he was again submitted to operation, the wound was re-opened and the cord was again exposed. The extrusion of the tumor-mass had evidently continued, though part still remained in the cord. The edges of the incision had become considerably separated and the tumor was now gently coaxed or teased from its bed in the cord with the aid of small pledgets of gauze. The tumor was exceedingly friable and soft and came away only in small fragments. Finally every particle appeared to have been removed. The wound was then closed and the patient returned to his room in good condition. The subsequent surgical course was without incident.

The tumor had involved in part the eighth cervical and the first and second dorsal segments of the cord. Because it was very soft and friable, its shape and size could not be accurately determined but it appears to have been considerably over an inch in length and a half inch in diameter. The cavity left after its removal was quite noticeable in size. A microscopical examination revealed it to be an angio-endothelioma.

Within twenty-four hours after the operation, the patient became cognizant when the left leg or foot was touched. Curiously enough he felt the touch as something hot or burning, and he could not localize the impression save to say that it was the left limb which was touched. It was noticeable also that the reflexes both deep and superficial had disappeared. Subsequently, however, they were again elicited as before. Within a few days the hypesthesia of the hands and arms grew markedly less and soon disappeared. This was followed by a rapid gain in power over the movements of the fingers, hands, wrists, forearms and indeed of the upper extremities generally. The improvement in the right upper extremity was somewhat more rapid than in the left. Twelve days after the operation the patient was able to abduct distinctly the left thigh. He complained of needle and pins feeling in both legs. Once or twice slight movements were noticed in the toes.

On March 7, he distinctly recognized touch upon the left leg, but still maintained that it gave him a sensation as of something hot. Little farther progress was noted until April 11 when it was found that he could slightly flex the thighs; both lower extremities could

be drawn voluntarily toward the body. The knee jerks responded normally; a slight ankle clonus was elicited on the left side, and Babinski upon both sides. It was also found that the area of anesthesia on the trunk had receded, so that the patient readily recognized tactile impressions as low down as the level of the fifth rib upon both sides.

Subsequently he began to notice distressing sensations in the bladder and on April 15 complained of severe pain in the bladder. Previously of course the patient had had no consciousness of any portion of his trunk and lower extremities and the fact of his being able to recognize pain in the bladder was very significant. A tangible cause for the pain was soon revealed by the evidences of a cystitis and a somewhat alarming rise of temperature. Both symptoms were brought under control but the ability to recognize bladder sensations persisted.

Improvement in the sensation continued so that by April 22 it had been recovered in a large measure over the entire trunk. Tactile impressions were clearly recognized as such, but upon the legs tactile impressions were still interpreted as heat and burning. The patient was also able to move the lower extremities, *e. g.*, flexion or abduction of the thighs, slightly, but as regards motion the improvement had not kept pace with the improvement in sensation.

On April 27, 1916, the patient is again examined. He had been under treatment for some days by vaccine therapy for the cystitis and had had some febrile reaction. At this examination the level of the anesthesia upon the trunk is a little below the level of the fifth rib, both anteriorly and posteriorly. Above this level the sensation to all forms is well preserved. Hypesthesia in the arm has now disappeared; sensation in the upper extremities, upper portion of chest and shoulders is apparently normal. Patient still mentions pain in his bladder. Though he had previously recognized touch upon the abdomen and elsewhere upon the trunk, his answers below the fifth rib are now doubtful. He is immediately aware when the left leg is touched, especially in the region of the calf. The impression is not felt as touch, however, but is still translated into a burning sensation. Is able to recognize hot and cold fairly well over the left lower extremity, though this ability grows less and is gradually lost as the trunk is approached. Is unable to appreciate tactile impressions in the right extremity at present examination. He recognizes and correctly describes passive movements made at the hips and knees. He does not recognize movements of the ankle or of the toes. The knee jerks are present, left somewhat more pronounced than the right. An ankle clonus is present upon the left, not upon the right. Babinski is present upon both sides, more marked upon the left. As far as the sensory findings are concerned, the improvement is less manifest than at the previous examination. He fails to recognize or localize tactile impressions upon the chest or abdomen below the fifth rib. It is of course possible that this is related to his general condition. In other respects the improvement has continued, though it has been slow.

The success attending both the localization and the removal of an intramedullary tumor of the cord cannot be recorded without paying tribute to the work of Elsberg, the pathfinder in this field.¹ We all recall the brilliant results attending his very first case, in which the patient not only recovered the power of walking but actually returned to work, as well as gratifying results attending many of the ten or more cases upon which he operated subsequently. The introduction of the principle of incising the cord and thus to bring about the extrusion of the tumor, itself a purely automatic and spontaneous act, marks a veritable epoch in the history of spinal surgery. How successful it was in the case here reported we have already pointed out. Roepke, Schultze, Foerster, Krause, and others have operated on intramedullary tumors with some degree of success. Roepke² states on the basis of his own case that encapsulated intramedullary tumors can be removed without damage by incising the substance of the cord in the middle line and carefully shelling out the growth. Spontaneous extrusion of the growth would seem to be the safer procedure.

Before dismissing this case from further consideration, it is interesting once more to recall some of its salient features in relation to diagnosis. First among these is the illusory and insignificant character of the pain. Pain was no longer present when the patient was first seen at the hospital, merely a vague sensation of numbness; pain as such had disappeared. There was secondly the sensation of "hardness" and "weight" over the abdomen which taken together with the paraplegia, anesthesia, sphincter losses and bed-sore, could readily have allowed the diagnosis of a diffuse myelitis to have been made. The history, however, of initial pain, ill-defined as it was, and the fact that it was in the beginning limited to one upper extremity but soon became bilateral, gave a distinct clue to the case. The growth was apparently so situated as not to give rise to root pain save very indirectly and this we believe to be one of the instructive lessons of this case. The growth was completely contained within the substance of the cord, though covered posteriorly by merely a thin layer of white matter.

Again, the fact of the xanthochromia of the spinal fluid is of interest. That it was not due to bile salts was readily demonstrated; it did not appear to be due to altered blood such as might have gained access to the dural sac; it therefore seemed directly referable

¹ See especially, *Surgical Treatment of Intramedullary Affections of the Spinal Cord*, Seventeenth Int. Congress, 1913, Section XI, Neuropathology, Part II, p. 187.

² *Archiv f. klin. Chirurgie*, 1911, Vol. 96, p. 963.

to the pathological process in the cord. Xanthochromia, as is quite well known, has been a not infrequent finding in tumors of the cord. Roepke regards a large amount of protein content, a yellow coloration of the spinal fluid, with a small increase of cell content, taken together with the clinical findings, as of great importance in the differential diagnosis between tumor of the cord and multiple sclerosis and spinal lues. He believes that the high percentage of protein content and the yellow fluid stand in close relation to each other; he thinks that they result from the disturbances of the circulation caused by the space-encroachment of the tumor. It is noteworthy that especial stress was also laid by Schultze³ on this feature in the case of a tumor which was partly extra- and partly intradural and in which the spinal fluid was yellow, coagulated and contained a large amount of protein. The question suggests itself whether the fact that the growth in the case here reported was an angio-endothelioma, *i. e.*, was unusually vascular, did not in some way account for the change in color of the cerebrospinal fluid.

³ Deutsche med. Wochenschr., 1912, p. 1676.

THE CAUSE OF THE ALLORHYTHMIC TYPE OF TREMOR IN PARALYSIS AGITANS¹

BY LEWIS J. POLLOCK, M.D.

INSTRUCTOR IN NEUROLOGY AND PSYCHIATRY, NORTHWESTERN UNIVERSITY
MEDICAL SCHOOL

Rhythmical variations in the amplitude of tremors have been observed for some time. Fernet (1) recorded two such cases showing these variations and described the fusiform enlargements in the tracings as nodes. Commenting upon these nodes Maude (2) states that "as to amplitude in the vertical direction the oscillations present anything but regularity. If we examine tracing No. 1 of Marie (p. 20) we see the waves increase for a certain number and decrease again. These variations are very irregular and no explanation has yet been offered as to their causation; but they certainly have no correlation with the movements of respiration or circulation." He, however, states that a distinct correlation is found to exist between the increased wave and the occurrence of cough.

Gowers (3) states that he has observed a tendency to rhythmical variations but once. With the exception of Neustaedter (4), the various investigators have not attributed to this rhythmical variation or allorhythmic type of tremor any diagnostic importance. Neustaedter, however, states that the characteristic feature of the tracing of paralysis agitans is, "the rhythmical periodicity of the curve."

Eshner (5) states that the tremor of paralysis agitans and diffuse sclerosis shows a tendency to regularity and rhythm. Wertheim Salomonson (6) concludes that allorhythmic tremors are constantly found in Graves' disease, mercurial, lead and alcoholic tremors, paralysis agitans and hysteria.

Although all the tracings of tremors which he shows in his article show some tendency to more or less rhythmical variations in amplitude, I am not convinced that the records of the tremors in conditions other than paralysis agitans are illustrative of such a typical allorhythmic type as shown to be present in this condition by Neustaedter.

As pointed out in part by Eshner, tremors occurring in all conditions are subject to such extraneous influences as sleep, rest,

¹ Read before the Chicago Neurological Society, January 20, 1916.

fatigue, associated movement, voluntary movement, emotions, hunger, the taking of food, distraction, muscular tension, comfort and relaxation, all sensory stimuli, etc. It is possible to obtain perfect tracings of allorhythmic tremors only with the exercise of great care and patience, and only under proper conditions. I have observed the regular occurrence of typical allorhythmic tremors in eight cases of paralysis agitans; whereas in one case each of arteriosclerosis, alcoholic tremor, multiple sclerosis, senility and hysteria, I was unable to demonstrate it. Wertheim Salomonson found them in ten of fifty-five cases examined, embracing the conditions mentioned above. In this study he concluded that the cause of this

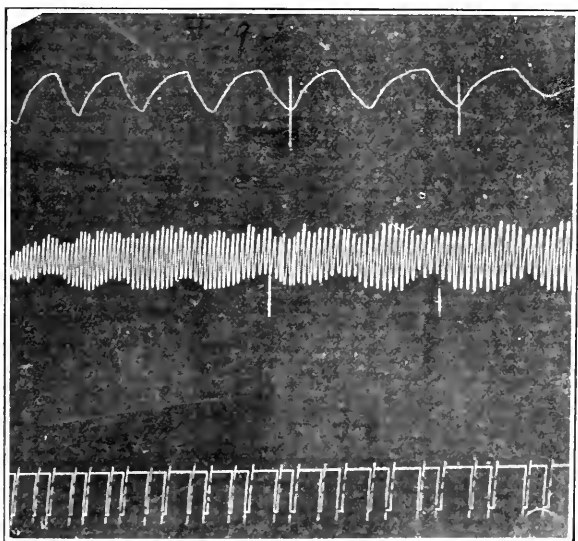


FIG. 1. Upper tracing respiration, lower tremor. Allorhythmic nodes coincident with respiratory phases.

variability does not lie alone in the cause of the tremor, but we must seek for it in the anatomical and physiological features upon which the mechanical conditions of tremors depend. We will not concern ourselves with his exhaustive and brilliant study of the mechanism of tremors. He, too, felt that a possible relation might exist between respiration or circulation and these allorhythmic tremors. He, therefore, made a simultaneous record of respiration, pulse and tremor and from this, "*Allerdings nicht sehr schön erhalten*" curve (with which description we are forced to agree), he concludes with Marie that not the least relation exists between respiration and tremor or heart action and tremor.

Under such conditions as allowed a tracing of a long continued, regular allorhythmic tremor to be taken simultaneously with the respiration curve, I have seen a very definite relation between the phases of respiration and the variation in the amplitude of the tremor. In paralysis agitans the node is narrowest at the height of inspiration and largest at the height of expiration. The amplitude diminishes with inspiration and increases with expiration (Fig. 1).

Where the tracing is obtained from the thumb and the hand rides upon the abdomen or lower part of the chest, the nodes may be seen to occupy the same time as the wave caused by the respiratory movement which is transmitted to the hand, and it coincides with the respiratory curve obtained by an Ellis pneumograph (Fig. 2).

The allorhythmic tremor appears in the thumb even when the arm is supported well away from the body.

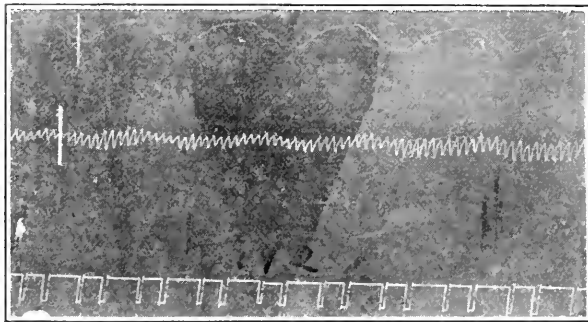


FIG. 2.

Particularly convincing of the fact that respiratory movements bear a causal relation to these tremors are such tracings as include an involuntary irregularity of respiration. During the period of time occupied by this irregularity the tremor likewise shows an irregularity (Fig. 3).

The dependence of the allorhythmic tremor upon respiration is due most probably to the interference with the muscles involved in the tremor by the transmitted movements of respiration. It has long been known that the tremor of paralysis agitans is highly susceptible to such influence as voluntary movements (Mott, Williamson, etc.) and associated movements, as closure of the opposite hand, etc. (Eshner). This high degree of susceptibility to such influence probably accounts for the regularity with which allorhythmic tremors may be recorded in this condition.

In conclusion I wish to say that in a tracing in paralysis agitans in which the extraneous influences, such as mentioned above, are not excluded, the rhythm of the tremor is irregular and is difficult to interpret. Here and there a node may be picked out which is synchronous to respiratory phases, and respiratory movements are

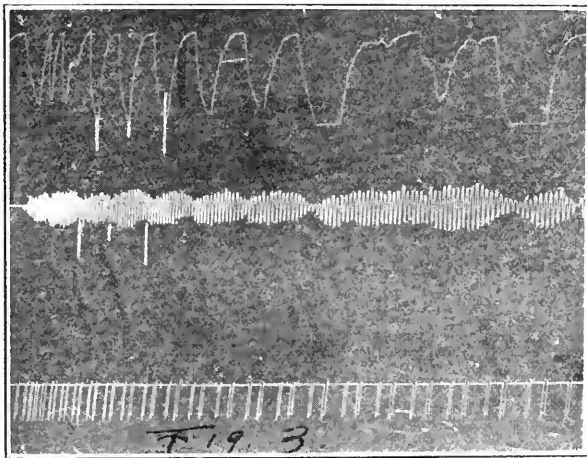


FIG. 3. Involuntary irregularity of respiration with coincident irregularity of rhythm of tremor.

to a degree responsible for the variations in amplitude. Under perfect conditions a regular allorhythmic tremor is obtained in paralysis agitans and here the respiratory movements alone are responsible for its origin.

REFERENCES

1. Fernet. Quoted by Wertheim Salomonson.
2. Maude. *Brain*, xv, 1892, p. 424.
3. Gowers. *Manual of Diseases of the Nervous System*, 1893, 2, p. 643.
4. Neustaedter. *Med. Rec.* New York, lxxvi, 1909, p. 91.
5. Eshner. *Jour. Exper. Medicine*, II, 1897, 301.
6. Wertheim. Salomonson. *Deutsche Zeit. f. Nervenheil.*, x, 1897, p. 243.

WERDNIG-HOFFMANN EARLY INFANTILE PROGRESSIVE SPINAL MUSCULAR ATROPHY*

BY M. A. BLISS, M.D.,

ST. LOUIS

Three cases of a familial form of early infantile paralysis in a family group of four children. The eldest now nine years old is healthy.

ELEANOR

Eleanor, the fourth child, was born after normal labor. She was twenty-five months old on May 6, 1915, the day I first saw her.

She seemed to her mother quite normal up to the time of attempting to walk, at about ten months of age. Her first attempts



FIG. 1. Eleanor.

at walking were fairly successful, but gradually became less so. She has always been plump, of good color and well nourished and has been unusually bright mentally.

She now stands with support but with the feet wide apart, the knees showing a backward bend and the feet thrust forward. There is no lordosis. When sitting on her mother's lap, the feet fall into the position of foot drop, and in attempts at walking with support her toes touch the floor first. She sits on the floor unsupported. Her hands and arms are used normally. She has no difficulty in swallowing. The teeth are normal. The heart and lungs act normally.

* Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

She is very bright and talks slowly but clearly. She points to the eyes, nose and mouth when asked to do so. Her limbs are well rounded, feel normal to touch and pressure and show neither atrophy nor hypertrophy. There is no spasticity. The limbs are lax when she is not irritated but not unusually so. She can perform all the normal movements, but dorsal flexion of the feet and flexion of the thighs are not vigorous. The feet may only be flexed a little beyond right angle. The head is well supported. There is no cranial nerve palsy.

No sensory loss can be determined, either to pain or tactile impressions. Electrical reactions are not attempted.

The knee and ankle jerks are absent. The plantar reflex is of the extensor type. The sphincters are normal. The pupils react normally and the eye grounds are normal.

An X-ray plate including the entire body, is negative.

Beside the changes observed in the reflexes and the weakness of the hips and lower extremities nothing abnormal can be made out.

A blood Wassermann of the mother is negative.

The mother shows nothing abnormal on examination. The father is said to be healthy.

There is no history of any nervous disorder in the family of either the father or the mother. Especial inquiry as to myopathies gives no results. A boy, the eldest of the children, now eight years old, is normal.

I had an opportunity to see the child twice only. The parents live in Nebraska and the subsequent history, as well as the history of the two boys who were afflicted in like manner, I have from the mother.

May 25, 1915. She does not stand by holding to chairs and at times it seems an effort for her to sit alone on the floor. She still creeps well and talks as well as usual. Digestion is good and she sleeps well. She does not grind her teeth but at times she breathes hard. She often bites her fingers in attempts to feed herself.

June 7. She still uses her hands well but more slowly. She has considerable difficulty in swallowing and often chokes in drinking milk or water. She has a good appetite and sleeps well. At times when she wakes, her limbs are rigid and she cries out apparently with pain. She makes no effort to stand and has difficulty in sitting up on the floor. She looks well and talks in her slow way, but less than formerly. She is quick to see and to know what goes on about her.

June 24. She no longer sits without support.

July 8. She cannot creep and has much difficulty in using her hands, which tremble violently when she uses them. She is drooling saliva.

August 12. She was so ill for a week that death seemed imminent but is now better. She drools incessantly and uses her hands scarcely at all.

August 30. She has great difficulty in swallowing. At times

her eyes cross. Attacks of rigidity in all her limbs occur at times and cause her to cry very hard.

Oct. 7. The attacks of cramping and stiffening have been more frequent and more severe, and last an hour or longer and she cries very hard. She has great difficulty in swallowing and grinds her teeth very hard. She looks well and has not lost much flesh. She has not been able to speak a word for four weeks. Her feet are quite badly drawn out of shape now. She has good sense of feeling in her limbs but they get at times as hard as rocks.

Nov. 2, 1915. The cramping is severe. She has great difficulty in swallowing and she has not spoken a word for nearly eight weeks.

Nov. 6, 1915. She is drooling more. She has a dreadful time when her bowels move. Some days she can scarcely swallow water. When she does not have Dover's powder, her arms and legs are perfectly rigid.

She knows everything and smiles when we say something that pleases her. Her limbs are getting very thin but her face is full and her expression fairly good. Her eyes are inclined to set on objects at times. I know she grows a little weaker every day.

Nov. 23, 1915. At 3:30 in the afternoon, Eleanor had a convulsion, more violent than those the other children had. She suffered terribly for an hour but was conscious. The twisting and cramping of the muscles was very severe. She lived in this condition until 6:45 the next morning. For two days before the convulsion her legs twitched a great deal. Her intelligence was perfect to the last. On the day of the convulsion her temperature rose and at three in the afternoon it was 103. Her lungs filled quickly and pneumonia was diagnosed. Her temperature was 105 the last time it was taken.

THE MOTHER'S DESCRIPTION OF PAUL

Born April 15, 1909. He weighed about eleven pounds. He seemed perfectly strong and healthy but at times would cry very hard when nothing could be found to explain the condition. At nine months he was walking round chairs.

The summer after he was one year old he walked a great deal in a "baby walker." He crept a great deal and was always well and busy and said his words very plainly. He had all his teeth when he was a year old and sat in a high chair and fed himself.

He had pneumonia when he was twenty months old. He was very sick but made, after ten days' desperate illness, a good recovery.

After this he did not attempt to walk as much and dragged one foot.

He held his head on one side and seemed often very tired. He began to have bowel trouble and his stools were horribly offensive.

The weakness then seemed to be in his knees and then in his hips and then we thought his spine was affected. Physicians who examined him could find no cause.

In June, 1911, he seemed very nervous with his hands. In August he could no longer creep. In September he could scarcely

sit alone. He began drooling and his teeth decayed. All this time he ate well and slept well but ground his teeth very much at night.

He seemed so limp and could not sit in a chair, even if tied in it.

He seemed like he did not have a bone in his body and his feet and hands began to turn in.

About three months before he died the diarrhea ceased and it seems as though his bowels were paralyzed.

The drooling grew worse and swallowing became very difficult. For about two months he could take nothing but liquid nourishment.

He lay all day on a bed, except taking "Osteopathic" treatment, which seemed to relieve the stiffened and cramped state of his muscles.

The end came in a convulsion of mild form. There was no change of color, only a set expression and flickering of the eyeballs.

Paul did not talk for over two months before he died.

He lived in the convulsion from seven o'clock Sunday until eleven o'clock Monday morning. He was 36 months old.

DESCRIPTION OF BILLY

Born September 30, 1910. Weighed almost twelve pounds and was always perfectly well and strong in babyhood. He cut his teeth early and began trying to walk around things when nine months old. He was so full of life and a regular romp and every one said he was surely a perfect child.

He began trying to talk early and when he was thirteen months old, we thought every day that he would be walking alone the next. He continued trying to walk for months. When he was twenty months old he began to drag one foot a little when trying to walk. He seemed to be so tired and his eyelids began to droop. He ceased trying to walk and began to bite and pinch us. When he succeeded he would give a convulsive little shudder.

Then his hands began to tremble when he tried to feed himself or use them in any way. He had the same terrible odor to the stools, as the other boy. His teeth began to decay and he ground them at night as Paul did.

When he was twenty-five months old he was still able to play and could still talk some, and would sit about on things and stand by a chair a little while at a time. But he drooped as though his weight was too much for him when sitting down.

On this day he was more quiet than usual and seemed so tired. He would rouse himself and straighten himself up and then relapse into a relaxed position again. Suddenly he threw up his hands and went into a convulsion more severe than the other boy had. He remained in this convulsive state until the next day when he died without having regained consciousness.

All of the children had the same drooling, their feet began to turn and droop at about the same age and the same dragging of one foot at the first and the same tired expression after a time and the same peculiar odor of the passages. All of them at about the same age, sixteen months, had a bright rosy spot on each cheek. After a

time this faded and left them pale. The spots were not like the normal rosy cheeks of a baby but were reddish spots about the size of a half dollar.

All three children had attacks of rigidity, but the boys did not suffer in this way so much as did Eleanor.

Paul was always so weak and resigned during the last three months and could not raise his head or even be propped up with pillows.

Eleanor could sit up supported by pillows and seemed to resist giving up.

Dr. F. E. Batten, *Allbutt's System of Medicine*, Vol. VII, p. 715, gives the following description of the Werdnig-Hoffmann type of atrophy.

SYMPTOMATOLOGY

An apparently healthy and intelligent child, who had made the normal progress of an infant for the first few weeks or months of life, begins, without sudden onset, and without obvious cause, to lose power. The weakness is first noticed in the legs and in the hips; as the disease progresses the lower portion of the back becomes affected, so that the child is no longer able to sit up. The disease pursues a progressive course, the shoulders, thighs, upper arms, forearms and legs being successively involved, and finally the muscles of the hands and feet. Fibrillar twitching of the muscles may be present, bulbar symptoms may supervene, and contraction of the limbs may be present in some cases. The limbs are usually absolutely flaccid, and the deep reflexes are abolished. There is no pain or tenderness, and no disturbance of sensation.

The disease runs a slowly progressive course, death taking place from failure of respiration or broncho-pneumonia.

Although pathologically these cases closely resemble the progressive muscular atrophy of adults, they present considerable differences.

The disease starts in the proximal muscles, and only later affects the hands. The atrophy is not so striking as in adult cases; in fact, the infant often appears well nourished. Cases with spastic condition of the legs are rare.

MORBID ANATOMY

Atrophy of the anterior horn cells, degeneration of the spinal roots, and atrophy of the muscle fibers. Changes in the crossed pyramidal tracts are very slight or altogether absent. In Beevor's

case there was some degeneration of the fibers of the posterior columns.

Pathological Findings.—The only definite change revealed in the peripheral nerves is an apparent loss of fibers in some of the bundles, while a certain portion of the fibers that remain are small and poorly stained.

Section of the spinal cord stained by Van Gieson's method shows no inflammation or interstitial change, but the most striking feature apparent in section of all regions is a paucity of cells in the ventral horns and the small size of those cells which remain.

All the muscles (except the diaphragm) show a large number of atrophied or undeveloped muscle fibers. There is little or no increase of interstitial fat and connective tissue between the individual fibers in striking contrast to the condition found in myopathic muscles.

It seems possible that many of the small muscle fibers may never have developed.

The report of the case of the third child of this group, which I had the opportunity to examine, even lacking observations of the electrical reactions and post-mortem findings, seems justified by the rarity of the affection and the value of clinical description.

The report of a like condition in the two brothers is prepared from the account given by an exceptionally observant and intelligent mother, who has made every effort to report the facts accurately.

The distance from St. Louis of the home of the parents made more detailed observation impossible.

It is evident that all of these children were bright and intelligent and that without sudden onset or obvious cause they began to lose power. In the case of Paul, pneumonia intervened at twenty months of age, but the process had already established itself and seemed only hastened by the illness.

I have concluded from a fairly complete survey of the literature that the cases more nearly correspond to the early infantile progressive muscular atrophy of Werdnig-Hoffmann.

The very steady and uninterrupted progress of the disorder, beginning in the second half of the first year, its progression to death in each instance, the familiar feature, the advance from the lower to the upper extremities and to parts supplied by the bulb, the presumption from the clinical description that the trunk muscles became involved in each instance, all point more strongly to the Werdnig-Hoffmann type than to the group amyotonia congenita.

Rothmann in 1909,¹ Batten,² Spiller in 1913,³ have all reported quite fully on the question of similarities and differences between the two disorders. Batten reported from his own experiences and from the literature only thirteen cases with necropsy.

Spiller discusses the close similarity of the Werdnig-Hoffmann type to amyotonia congenita, not only in the clinical features but in the many pathological findings as well.

Rothmann concludes that no sharp lines of distinction can be drawn and that all gradations exist between the two disorders.

The occurrence in the later stages of the disease, in my cases, of severe attacks of muscular rigidity, I have not found described elsewhere. No convulsions attended by unconsciousness occurred until the time of death, and in each instance the child survived in this convulsive state at least fifteen hours.

The atrophy was not apparent when I examined Eleanor. She was well nourished, so that any beginning atrophy could have been obscured by fat; but later in the disease her entire body, save the face, became, according to her mother's account, "very thin."

It seems doubtful, even if the electrical reactions could have been made, that they would have helped in the differentiation, for the same gradations seem to exist in this respect as in the clinical and pathological features.

¹ *Monatsschrift für Psychiatrie und Neurologie*, Vol. XXV, 1909, p. 161.

² *Brain*, Vol. XXXIII, 1910, p. 433.

³ *Proceedings of the Seventeenth International Congress of Medicine*, Section of Neurology, p. 115.

FAMILY SPASTIC PARALYSIS¹

By JOHN H. W. RHEIN, M.D.

PROFESSOR OF DISEASES OF THE MIND AND NERVOUS SYSTEM AT THE PHILADELPHIA
POLYCLINIC AND COLLEGE FOR GRADUATES IN MEDICINE; NEUROLOGIST
TO THE HOWARD HOSPITAL

The following cases are illustrations of a comparatively rare type of family spastic disease, namely spastic diplegia.

CASE I.—M. B., aged 6, applied June 25, 1913, to my clinic at the Philadelphia Polyclinic Hospital, having been referred by Dr. James K. Young, to whom I am indebted for the privilege of reporting this case together with those of the other members of the family. The family history was negative. There was no nervous history in the grandparents, uncles, aunts or parents. The mother had had five children, one of whom died at the age of 14, having developed between three and four years of age the same disease as the one to be described. One child, five years old, at present is well; the other three are all affected.

Mary was born at full term, head presenting without forceps and without natal trauma. She was healthy at birth, talked at one year of age and walked at sixteen months of age. She was perfectly well until she was a few months past four years old, when she began to become stiff in her legs. This progressed gradually and was associated with mental failure beginning about one year after the onset of the disease.

Upon examination on June 25, 1913, the following condition was observed: The legs were spastic and she was unable to walk except with assistance. The arms were beginning to show some weakness, the knee jerks were increased equally on both sides, there were bilateral ankle clonus and Babinski phenomenon and the arm jerks were exaggerated on both sides. The tongue was only partially protruded and was pushed a little to the left. There was no atrophy or loss of vesical or rectal control. The thyroid gland was not enlarged and the shape of the head was good except for a rather low forehead. Sensation was undisturbed and the teeth were poor. Examination of the eyes showed a sluggish pupillary response to light and a tendency to convergence of the eyes. There was no pathological change in the eye grounds. On September 21, 1914, examination showed that the disease had progressed considerably. She walked on her toes and the rigidity of the limbs was more marked. She had deteriorated mentally and her speech was indistinct. She was unable to protrude her tongue upon command. The arms were slightly spastic and there was weakness in the extensor

¹ Read before the Philadelphia Pediatric Society, October 13, 1914.

group of muscles on both sides. All the reflexes were increased as in previous examinations.

CASE II.—H. B., aged 12, was admitted to the Philadelphia Polyclinic Hospital to the service of Dr. James K. Young, June 20, 1913. His birth was easy and he was breast fed until he contracted whooping cough at the age of five months, at which time he had one convulsion. At the end of one year he was eating most of the table stuffs, before which his diet had been condensed milk. He developed measles at the age of six, but aside from these two diseases he had been well until between the age of four and five years, when he began to be irritable and then there developed stiffness of his legs. About a year later mental changes began to take place. Upon examination Harry presented the following conditions: He was fairly well nourished, was restless and grasped at objects about the bed and scratched the bed covers. He was noisy and talked a great deal but unintelligibly. The mouth was kept open most of the time. He was unable to protrude his tongue, although he opened the mouth on command. There was apparently no facial paralysis. The arms were spastic and the arm reflexes exaggerated. Both legs were spastic and contracted and could not be extended. The legs were small, especially below the knees, but there were no local atrophies. The knee jerks were increased and there were bilateral ankle clonus and Babinski. Sensation was undisturbed. The physical examination of the lungs and abdomen resulted negatively. There was a loud blowing systolic mitral murmur over the precordia. The cremasteric reflexes were absent, the abdominal reflex present. The examination of the eyes by Dr. Peters on June 30, 1913, resulted in the following: Pupils were equal and reacted to light and accommodation. The right media was clear and the edges were well defined. The temporal side was slightly paler than the nasal side and the veins were over-filled. The arteries were somewhat narrower, but the fundus otherwise was healthy. The condition of the left eye was the same as that of the right except that the pallor was decidedly more marked on the temporal side of the disc and the arteries showed a greater degree of narrowing. The Wassermann reaction was negative.

CASE III.—L. B., aged 8, entered the service of Dr. James K. Young at the Philadelphia Polyclinic Hospital, June 20, 1913. This patient had much more serious difficulty than Harry, the brother. He had a peculiar cry. There was marked spasticity of both legs, although the muscles of the calf were flabby and undeveloped. There was beginning spasticity of both arms. There were no atrophies. The knee jerks were exaggerated and there was ankle clonus on both sides, tests for which produced spinal epilepsy. Babinski sign was present on both sides. The cremasteric and abdominal reflexes were normal. Wassermann reaction negative. There was pronounced mental deterioration, and rectal control was lost. An examination of the eyes by Dr. Peters on June 30, 1913, was as follows: Pupils reacted to light and accommodation and were equal. In the right eye the media were clear, the disc round and the deeper layers profoundly pale and the

veins over-filled. The arteries were normal. The fundus was otherwise healthy. The left eye was the same as the right but the pallor not quite so marked.

CASE IV.—H. B., aged 4, was brought to my clinic on September 2, 1913. She was born at full term without instruments and was healthy at birth. She cut her teeth at seven months, and talked at twelve months of age, and walked at the fifteenth month. She appeared to be intelligent and healthy and had never been sick since birth. The knee jerks were slightly increased and there was bilateral Babinski but ankle clonus was absent and the arm jerks were not increased. There was no atrophy of the muscles and no spasticity of the limbs and the gait was normal. Upon examination on November 19, 1915, she was still in good health and had escaped the disease.

These cases are reported as illustrating the variations which may be observed in cases of family spastic paralysis, which was first observed by Strümpell (1). He classified the cases into two groups, in one the disease beginning between the twentieth and thirtieth years of life, and in the second occurring between the third and sixth years or somewhat later.

In the first group the symptoms were rigidity of the legs, exaggerated reflexes, and spastic gait, and while there was some weakness of the flexor muscles, and lower leg muscles, the arms remained unaffected, as well as the bulbar and cerebral regions. These cases presented a pure sclerosis of the pyramidal tracts, the tracts of Goll and the cerebellar tracts.

In the second group of cases, the symptoms correspond to the spastic paraplegia of adults. In these cases there was some retardation of the mental development. Oppenheim (2) recognized that in the cases beginning in early childhood, the upper extremities may become involved, and there may occur strabismus, speech disturbances, nystagmus. Spiller (3) believed that the family form of spastic paraplegia seemed to be the result of degeneration of the distal portion of the pyramidal tracts, the result of some imperfection of development, and that these cases differed from the cases of Little's disease from premature birth, in which the pyramidal tracts are arrested in their development, and not degenerated.

There is a very extensive literature including the cases of family spastic paralysis and transitional forms. A review of this literature confirms the theory advanced by Raymond (4) and Rose and Jendrassik (5) that intermediary forms exist between typical syndromes and also the claim of Delarde and Minet (6) that there exist all forms of transition between the family type of spastic paraplegia, family amyotrophic lateral sclerosis, family cerebral

diplegia and family multiple sclerosis, and that these are really but a series of types in which the spastic contractures of the limbs predominate in each type which presents variable associations of different symptoms. I have studied all the available cases in the literature and found it possible to differentiate several types, perhaps the most common being that described by Strümpell, in which the legs alone are affected, and the arms and cerebral region are unaffected.

A second group of cases includes those in which the disease extends to the arms and may or may not be associated with some mental failure.

A third group of cases shows symptoms indicating implication of the cerebellum. To the spasticity of the legs may be added cerebellar symptoms, nystagmus, scanning speech, with or without mental deficiency.

In a fourth group of cases, bulbar symptoms are added to the spasticity which involves the legs and arms.

In a fifth group spastic paraplegia is associated with muscular atrophy, either in the legs or arms.

In a sixth group, tremor in the legs or arms or both, may be associated with the spastic paraplegia. With these cases may also be classified those in which the symptoms are those of disseminated sclerosis, or similar to these.

Finally there is a seventh group of cases of family spastic diplegia.

The age at which the disease occurs confirms in a general way, the division made by Strümpell, that there is an adult form and a juvenile form. The cases, however, in which the disease begins after fifty years of age are only those described by Strümpell, Voss (7), Trenel (8), Giovanardi (9) and Courtellemont (10), in which the subjects were forty-nine or fifty at the age of development, and in the case described by Giovanardi, in which the disease began at seventy-one years of age.

A number of cases, however, occur between the ages of twenty and thirty-six, while two instances are on record where the disease occurred at the forty-second and forty-ninth year respectively.

Of seventy-two observations in which the disease began under the age of eighteen, in forty-six of these cases the first symptoms appeared before the tenth year of age. In the remainder of this number, the disease began between the ages of ten and eighteen.

A study of the cases shows, however, that a few instances occur in which the disease has begun in some members of the family at

under ten years of age, and in others over ten. For example, in the observations of Baümlin (11), one of the children developed the disease at four, and another at fourteen years of age. In a case described by Morquio (12), one child developed the disease at twelve years and another at fourteen months. In the observations of Cafiero (13) the disease began in one child at two years of age, and in another member of the family at thirty-seven. In the instance described by Schönfeldt (14), two of the children developed the disease at three and four, and a third at fourteen and a half years of age.

In many of the cases the disease began in very early childhood. A number of cases are on record where the disease began at two or three years of age (Naef (15), Finzio (16), Massalongo (17), Cafiero, Lederer (18), d'Abundo (19), Carini (20), Totze (21), Delarde and Minet, Jones (22), Holmes (23), Gee (24), and Hochhaus (25)); or even younger (Abrahamson (26), Dercum (27), Carini, Jones, Archard and Fresson (28), and Ganghofner (29)).

It has been described as occurring at the walking age or in the early months of life, as in the cases of Schultze (30), Cestan and Guillain (31), Cafiero, Viziolo (32), Pelizzi (33), Merzbacher (34), Santo de Santis (35), Lucangeli, Jendrassik, Bourneville and Cruzon (36), and Douillet (37); while in still another group of cases the disease appeared to have dated since birth or before the subjects were able to walk; as in the cases of Hagenbach-Burckhardt (38), Freud (39), Brower (40), Batten and Wilkinson (41), and Krafft-Ebing (42).

Nystagmus was present in some few cases, namely those of Lorrain (43), Jendrassik, Bernhardt (44), Pauly and Bonne (45), Cadwalader (46), Dreschfeld (47), Batten and Wilkinson, and Mertzbacher.

In Mertzbacher's case the nystagmus was associated with some disturbances of speech and awkwardness of the hands; otherwise the symptoms were typical. In Cadwalader's case the nystagmus was the only symptom aside from the spastic paraplegia. In the case of Mahaux (48) there was also a slight lateral nystagmus, and slight intention tremor of the hands. It was present in two of the cases reported by Jendrassik. In the case of Chugunow (49) there was also nystagmus, as well as incipient optic atrophy. In the case of Lorrain the nystagmus was associated with slight impairment of vision. In the two other members of the same family similarly affected nystagmus was absent. In the case of Pauly and Bonne, nystagmus was associated with intention tremor and de-

fective speech. In Batten and Wilkinson's case there was also tremor of the hands and arms. Strabismus was seen in the cases of Schultze, Jendrassik and Ganghofner.

A pathological heredity appears in a certain per cent. of these cases, such as those described by Souques (50), in which the maternal uncle was insane; and by Delarde and Minet, in which the father was an alcoholic and had a tremor. Alcoholism was present in the ancestry of the cases reported by Modena (51), Ballet and Rose (52), Mahaux, and Finzio. Chronic arthritis occurred in both the father and mother of the cases described by Malotti and Cantalamessa (53). In the cases described by Gee, two maternal cousins were deaf mutes, and one was born without fingers, while a maternal aunt was completely paralyzed.

Consanguinity occurred in the ancestry of the cases described by Seligmüller (54) and Higier (55). In the cases described by Pelizzi the father was alcoholic and syphilitic, the grandfather was alcoholic, a cousin was insane, another an inebriate, two paternal grandaunts were prostitutes, and the parents were first cousins. In the cases described by Santo de Santis and Lucangeli, the father was alcoholic and syphilitic. In the family described by Jendrassik the paternal grandfathers were first cousins and two grandmothers were cousins. In Reynold's (56) case the father developed melancholia, a first cousin died of disseminated sclerosis, a cousin had exophthalmic goiter. In a second family described by Lorrain, the mother was epileptic, and a maternal grandmother was hysterical. In still another instance described by Lorrain the mother had suffered from choreiform movements since the birth of one of her children. In the case described by Gabbi (57), an uncle died of dementia. In Raymond and Souques's (58) case, the father and paternal grandfather were alcoholic and the maternal grandfather died insane. The parents were related in the cases described by Erb (59), the maternal grandmothers were first cousins, and three of the great-grandmothers were sisters. In the cases described by Freud, the parents were uncle and niece. In Naef's cases, the maternal grandmother died of a nervous disease which showed itself in her inability to walk. In Donillet's cases the paternal grandfather was inebriate and the maternal grandmother died insane. In the cases described by Massalongo in which the symptoms presented the clinical picture of disseminated sclerosis, the parents of the children were related and there was a neuropathic history. In d'Abundo's case the parents were first cousins. Bramwell (60) attributed his case to hereditary syphilis, although it was absent in

the family history. In Ballet's (61) cases the father of the subjects was queer and the grandfather was an absinthe drinker. The father was an inebriate and the mother hysterical in Morquio's case. In Bäumlín's cases the father had a tremor since fourteen years of age after an attack of typhoid fever. In Trenel's cases a brother and maternal uncle were insane, a sister had convulsions and one sister had convulsions with mental impairment. There was inebriety in the paternal grandfather and father in the case described by Brower. In Carini's cases the mother suffered from convulsions, probably hysterical.

In most of the observations the disease has occurred in one generation only. However, in twenty-two reports the disease appeared in two generations (Punton (62) (two families), Courtellemont, Ballet and Rose, Raymond, Hoffmann (63), Kuhn (64), Buchard (65), Gee, Philip (66), Dobrochotow (67), Jendrassik (two families), Head and Gardiner (68), Reynolds, Castan and Guillain, Lorrain, Eichorst (69), Oppenheim, Freud, Dercum, and Brower); in three generations in four observations (Pelizaeus (70), Lorrain, Cafiero, and Cadwalader); in four generations in three observations (Voss, Raymond and Rose, and Mertzbacher); and in five generations in one instance, that of Bayley (71).

It is interesting to note that in a number of cases the symptoms appear to have followed infectious diseases, as in the cases of Newmark (72), Finzio, Krafft-Ebing, Melotti and Cantalamessa, Tooth (73), Jendrassik, Archard and Fresson, Schönfeldt, Souques, Massalongo, d'Abundo, Dercum, and Brower.

In Newmark's cases, the symptoms began after a fever in one case, and in another after pertussis. In Finzio's case progressive gait disturbance followed an attack of measles. In Krafft-Ebing's case defective gait was noticed during the convalescence of diphtheria. In one of the cases reported by Melotti and Cantalamessa the disease followed an attack of influenza and bronchitis. Gait disturbance followed an attack of scarlatina in Tooth's case. In a case described by Jendrassik, the first symptoms followed an attack of scarlatina. There was a history of a febrile disturbance preceding the onset of the symptoms in one case described by Archard and Fresson, and in a second, the legs began to stiffen after an attack of variola. In one case described by Schönfeldt, the gait disturbance followed an attack of typhoid fever. In Souques's case the symptoms developed in one after a fever, and the gait was worse in another after measles and variola.

In Massalongo's cases of disseminated sclerosis and spastic

paraplegia, the symptoms developed in both instances after acute illness.

In d'Abundo's cases of family multiple sclerosis, the disease followed pneumonia in one, a fever in a second case, and an intestinal fever in the third.

Dercum described two cases of family cerebral diplegia beginning after measles. Brower cites a case of diplegia of the family type, which occurred after a fever and a second case after erysipelas.

It would appear that some influence upon the development of the symptoms was exercised by febrile or infectious conditions. It may, however, be simply a determining one.

II

PURE TYPE OF FAMILY SPASTIC PARAPLEGIA

The cases that may be looked upon as pure examples of family spastic paraplegia, without involvement of the arms, cerebral nerves, or mental deterioration, have been reported by thirty-nine observers.

Krafft-Ebing presented three brothers afflicted with the same disease. The family history was negative and the children were born at term normally. First patient, aged six, had convulsions on the eighth day. Awkwardness of the legs was apparent in the fifth month. He did not sit up or walk until he was two years old. Strabismus existed until seven years of age. On examination, there was no nystagmus or disturbances of speech. The arms were normal except for slight exaggeration of the reflexes, and there was a slight lordosis in the lumbar region. He stood with his feet apart and had a tendency to fall backwards. The feet were contracted and in volar flexion. The adductors of the thigh were rigid. There was some reduction in the muscle power in the lower extremities. The gait was typically spastic. The patellar reflexes were greatly exaggerated. No electrical changes. Sensation and sphincters normal.

Second case, a boy, aged eight, who was normal until three years of age. During convalescence from diphtheria his mother noted a defective gait. Upon examination it was found that the mentality was slightly retarded, speech heavy and slow but not scanning. There was convergent strabismus and the reflexes of the arms were exaggerated. The feet were in an equinovarus position, the toes in hyper-extension; otherwise the condition was as in the above case.

The third case was a boy of four, who walked at two, but who presented strabismus since birth and heavy and lolling speech. The

reflexes of the arms were prompt but otherwise the arms were normal. The legs were pressed together in a sitting position and the feet were held in an equinovarus position and the toes flexed dorsally. The patient could not stand alone and would fall backwards. The cross-leg position is the only indication of spasticity, in as much as the hip and knee joints move freely. The patellar reflexes were exaggerated but there were no other disturbances.

Erb reported two cases, girls, whose parents were related, and whose maternal grandmothers were sisters. The first case, twelve years old, normal birth, developed, at four years, symptoms of spastic paraplegia with exaggerated tendon reflexes without sensory disturbances. The second case, aged six, showed the same symptoms as the above.

Hochhaus's cases were two sisters and a brother with tuberculous histories but otherwise negative. A female of twenty-one, a male of thirteen, and a female of eight, all showed symptoms of the affection in the second year, attaining its maximum in the sixth year. Symptoms, alike in all three cases, consisted of spastic paresis of the legs, increased reflexes and foot clonus, without sensory or sphincter disturbance. The youngest girl showed atrophy of the lower leg. All were born at term with easy labor and had no convulsions.

Souques cited the cases of a girl of ten, and her brother of seven, born at term without accident. A maternal uncle was insane. The girl, aged ten, developed difficult gait at three years which was worse after measles at three and a half and variola at four years. Both attacks were preceded by slight convulsions. The boy of seven developed the symptoms at five, after fever and slight convulsions. In both, there were rigidity of the legs, exaggerated knee jerks and foot clonus without sensory, trophic, electric, sphincter or cerebral troubles. The arms were intact.

Newmark described two members of the same family affected with spastic paraplegia, a girl of seventeen, in whom the knee jerks were exaggerated; no clonus, and arms not involved; and a boy of five, whose knee jerks were increased and slight clonus was present. A sister of the mother showed a tendency to exaggerated tendon reflexes of the arms and legs. A sister, of twenty-nine, showed exaggerated reflexes in the legs. A cousin suffered from spastic diplegia and occasional epileptic attacks.

He described also a second family (Connor), consisting of fourteen children, five of whom were afflicted with the same disease. The first case, a boy of sixteen, developed his first symptoms at

about fourteen and a half years of age, consisting of slight spastic gait, abnormal patellar and Achilles reflexes but no clonus, and without other demonstrable disturbances. The second case, a boy, showed stiffness in his legs at the eighth year of age. The knee jerks were exaggerated and foot clonus was present. The arm reflexes were also exaggerated and there was pronounced jaw jerk. There was no bladder disturbance. Some slight sensory disturbance in the lower limbs developed. The third case was a boy who developed the symptoms at eight years of age. The fourth case was a girl who at eleven years of age was normal and when examined nine years later had developed a typical spastic gait. Foot clonus was present on both sides, the patellar reflexes were exaggerated and the Babinski sign was negative. The arms were not rigid, but the reflexes were exaggerated. There was no sensory or bladder disturbance, no nystagmus or other optic disturbances. The fifth case was a boy who began to be stiff in his legs at eight years of age. The patellar reflexes were exaggerated and there was a slight foot clonus. The arm reflexes were active. At twenty years of age the condition had apparently remained unchanged for a number of years. The Babinski sign and foot clonus were present on both sides. The patellar reflexes were also somewhat exaggerated. The bladder and other functions were normal. Case six, a girl, developed at the age of six, after an attack of whooping cough and bronchitis, exaggerated knee jerks and slight foot clonus. Spasticity became pronounced in her seventh year. The seventh case, a boy, showed increased patellar reflexes at three and a half years of age, but was otherwise normal. None of the family with the exception of one showed any sensory, bladder or ocular disturbances, and all were normal mentally. Two of the patients died, and Newmark obtained an autopsy of both. The lateral pyramidal tracts showed a slight change, more pronounced in one than in the other. In both there was a diseased condition of the postero-median tract, especially in the cervical region.

Newmark reported the eighth child of the Connor family, who developed at the age of twelve, after an attack of fever, a typical spastic walk, with bilateral foot and patellar clonus, increased deep reflexes of the arms, tremor of the hands, positive Babinski sign without sensory or ocular disturbances. His brother, similarly affected, died of tuberculosis at the age of thirty-one. The spinal cord in this case showed degeneration of the lateral pyramidal tracts gradually increasing upward and a more marked degeneration of Goll's tracts increasing upward. The same changes were noted in

his brother, John, in whom the spinal cord showed a sieve-like perforation, such as is seen in anemic cases. Betz cells were lacking in the case of William, which was not true in the other two subjects, although more attention was paid to the large pyramidal cells in the latter two cases.

Raymond and Rose described the autopsy findings of a case previously reported in a girl whose sister showed similar affection at nine years of age and who herself was seized, at the age of twelve, with progressive spastic paraplegia without sensory or sphincter troubles. The post-mortem examination was entirely negative on the part of the nervous system. She died of tuberculosis.

Wirschubski (74) described family spastic spinal paralysis occurring in a female at the age of ten, and a brother who developed the same disease at eight. The patient was married at eighteen, and bore two children, the oldest being four years of age and both were normal. The symptoms consisted of contractures of the legs, active knee jerks and foot clonus. There was no muscular atrophy, no involvement of the mind, speech or sensibility and no involvement of the arms, although they were the seat of a slight tremor.

Hoffman described three cases of spastic paralysis in one family, one a woman of twenty-seven, her father aged fifty-six, and her father's sister, aged forty. The symptoms developed in all three cases at the age of twenty-three or twenty-four years, beginning with stiffness of the legs. The symptoms consisted of spasticity of the legs, spastic gait, exaggerated patellar reflex, and foot clonus with positive Babinski, Strümpell and Oppenheim reflexes. There were no sensory disturbances or sphincter involvement and no muscular atrophy. The speech was nasal and the jaw jerk was exaggerated. The arms were uninvolved except for some intention tremor and exaggerated tendon reflexes. Mental disturbance, nystagmus, and optic atrophy were absent. Wassermann reaction was negative.

Pick (75) reported two brothers with spastic paraplegia. The first, twenty-nine years of age, developed symptoms at six, and later some heaviness of speech and uncertain gait. The arms were not affected. The second case, twenty-one years of age, developed, at eleven years of age, increased reflexes, stiffness of the legs, and uncertain gait. The intelligence, speech and arms were not affected. Family history negative.

Cadwalader reported two brothers, aged eleven and seven, who developed at five years of age, nystagmus in the older and difficulty in walking in the younger. Difficult gait in the older began two

years later and both became spastic. There were increased tendon reflexes in both. In the older there were bilateral ankle clonus and Babinski with horizontal nystagmus; in the younger slight ankle clonus with left-sided Babinski without nystagmus. Sensation was normal in both and the mental development above the average. Family history showed first cousin, an uncle, a grandmother and grandfather on paternal side similarly affected.

Voss reported cases of hereditary family spastic spinal paralysis which ran through four generations. The patient's daughter, maternal uncle, mother, and maternal grandmother all suffered from the same disease. The patient, aged fifty-six, developed the disease at the age of twenty-seven. There were typical spastic gait, increased patellar reflexes, foot clonus, Babinski sign, psychic disturbances; sensory involvement and atrophy were absent. The mother developed the disease at the age of fifty, and his uncle at fifty years of age. One daughter at twenty-seven showed incipient indications of the disease, consisting of exaggerated patellar reflexes, patellar clonus and foot clonus. In these cases we find the disease transmitted to the female members of the family.

Punton reports two families, in the first of which a woman, fifty-nine years of age, shortly after her marriage began to be weak in the legs and then stiff. The patellar reflexes were exaggerated but there was no clonus or Babinski, atrophic changes, sensory disturbances, rectal or bladder sphincter loss, ataxia or ocular symptoms. The intelligence was average and the speech normal. The second case was her eldest son, aged thirty-four, in whom the disease began at sixteen years of age. The symptoms correspond to those of his mother. The third case was her brother, in whom the disease began at fifteen years of age. In this case there developed convulsions which recurred until the time of the examination, at which time he was thirty-two years of age. The fourth case was that of a younger brother who was well until his fourteenth year, when he developed a spastic gait and other symptoms similar to those of his mother and other brothers.

In the second family reported the first case was that of a child four and a half years of age. The child's mother developed stiffness and rigidity of the legs at about twenty years of age. There was no clonus or Babinski sign, sensory or speech disturbances and the arms were not involved. One of her sisters had spastic symptoms the same as her own. Her daughter seven and a half years of age began to be similarly affected at six years of age. The third child five and a half years old began to show symptoms at three years of

age. She was slow in talking but talked perfectly at the time of the examination.

Cramer (76) cited the case of a man, aged thirty-six, who presented a history of one sister and a brother similarly affected. There was a history of vasomotor troubles in the mother and aunt and two cousins. The brother developed difficulty in walking at twenty-seven years of age, the sister aged forty-three became stiff in her legs at the age of twenty-seven, and another sister died at twenty-eight, having had some difficulty in walking during the last years of life. The patient himself began at the age of twenty-eight to be weak and stiff in his legs. The mental condition was excellent. The arms were normal except for exaggerated reflexes. The legs were spastic and showed no sensory disturbances. The knee jerks and Achilles reflexes were exaggerated. The Babinski sign was negative.

Levy's (77) cases were two children, brother and sister, aged twelve and nine years respectively, whose parents were cousins. The girl developed, at the age of six, rigidity of the legs. She was mentally normal, there was spastic gait and spasticity of the legs, and the arm reflexes were active but not exaggerated. The patellar and Achilles reflexes were exaggerated but ankle clonus could not be determined on account of the rigidity. There was double Babinski sign. Sensory vasomotor changes were absent, as were also nystagmus, tremor and incoördination. The boy, nine years old, began to develop the disease at six years of age. The symptoms correspond to those of his sister except that he presented a slight tremor of the right hand and slight nystagmus.

Ogilvie (78) described a case of a girl who had two sisters who had some difficulty in walking, one of whom was a case of infantile hemiplegia and the other walked with a spastic gait, having exaggerated knee jerks and ankle clonus. Both knee jerks were exaggerated.

Courtellemont described three children in one family affected with the same disease, whose mother had been similarly affected. The first patient, aged fifty-four, presented the first symptoms at forty-nine years of age. All the reflexes were exaggerated on both sides, more on the left. She was able to walk without a cane but tired easily and complained of weakness in the legs. There were no ocular symptoms, tremor, atrophy or sensory symptoms.

The second case was a man of fifty, who presented his first symptoms at thirty-six years of age, beginning with a sense of fatigue and later developing into difficulty in locomotion, the gait

becoming typically spastic. There was slight incontinence, both patellar reflexes were exaggerated, and Strümpell's phenomenon was present on the right but not on the left. Muscular atrophy and sensory disturbances were absent. He could not entirely close the right eye.

The third case was a man who died at the age of forty-two, who presented his first symptoms at fifteen years of age.

Jones described eight cases of hereditary spastic paraplegia all presenting practically the same symptoms. In the first case, a boy of fourteen, difficulty in walking began between the ages of one and two. There were no sensory, coördinating or trophic disturbances, and the intelligence was normal. The gait was spastic, the knee jerks and Achilles reflexes were exaggerated, and bilateral Babinski sign was present. The second boy, seventeen years old, presented spastic gait, and increased deep reflexes. The third case, a boy of eleven, presented similar symptoms. Twins at seven years of age presented the same symptom complex. A boy of five had the affection to a moderate degree. Another boy of three was slightly spastic in the legs with increased reflexes. A child aged one year and two months, was unable to stand or walk, probably on account of rickets. There was no rigidity, but the reflexes were exaggerated and there was a slight ankle clonus. The arm jerks were increased in all of the cases but otherwise the upper extremities were normal. There were no bulbar disturbances. The existence of the affection could be excluded in at least seventy members of the stock, including the members of the most important line for over 150 years. The disease appeared in all of the cases between one and two years of age.

Kuhn described a hereditary family spastic paralysis occurring in three sons of a father who showed some difficulty in walking of a spastic type throughout his life. The disease began at the eighteenth year of age in one and in the other two at the twelfth year of age, with rigidity of the legs and some pain in two. There was no muscular atrophy. The tendon reflexes were exaggerated, and the gait was distinctly spastic. The patients were fifty-two, forty-eight, and forty years of age respectively.

Bouchard reported the cases of a father and daughter afflicted with spastic disease. The patient, a man of thirty-seven, began to be weak in his legs at twenty-two years of age and later rigid. The patellar reflexes were much exaggerated, but there were no other disturbances, except a slight alteration in speech. The daughter, aged eleven, showed the first symptoms of the disease at six years of

age. The legs were stiff and patellar reflexes exaggerated. The sensation and mentality were normal. The arms were not implicated except for a tremor of the hands.

Mahaux reported instances in a man of thirty-six, his sister aged forty, and his brother aged forty-three. Four other children in the same generation died of convulsions in early infancy. The patient, a man of thirty-six, had difficulty in walking after a convulsion in his third year, which continued to increase to the age of twelve, when his gait was typically pareto-spastic. The patellar reflexes were exaggerated and Babinski's sign positive. The arms were not involved except for a slight intention tremor of the hands (alcoholic?). Except for a slight lateral nystagmus the eyes were normal. There were no sensory, sphincter or speech disturbances.

Archard and Fresson described the disease in two sisters. Case 1, a girl aged seventeen, showed some difficulty in her gait since she began to walk at sixteen months of age. There was a history of serious illness when a few months old attended with high fever. At the age of nine or ten the legs became spastic, the knee jerks exaggerated but there were no sensory, sphincter or other disturbances. The mentality was medium. The second case, a woman of twenty-seven, learned to walk at ten months of age, and was normal until a year old, after an attack of variola, when her legs began to stiffen. The patellar reflexes were exaggerated, the gait was spastic and the mentality was subnormal.

Bayley and Spiller separately reported a series of cases in which the disease occurred in five generations of the same family. Bayley previously reported nine cases of this group, while Spiller reported fourteen cases. The disease began at the age of five, and consisted of spasticity of the legs with increased knee jerks, and in most instances clonus. There was no pain, numbness, bowel or sensory disturbances, ataxia, or diplegia.

Bayley's description of the series of cases follows: Case 1, a female aged thirty-one, was well until five years of age, when spasticity of the legs set in. The knee jerks were not obtainable. There was never any pain, numbness, sensory symptoms, bowel or bladder disturbances, atrophy, ataxia, or diplegia. Case 2, a male of twenty-eight, developed a general spasticity of both legs at the age of five. Knee jerks were exaggerated, ankle clonus was present on both sides, pupils reacted normally. No pain, numbness, static ataxia, bowel or bladder troubles. Case 3, a female of nineteen, was well until her fifth year, when she developed spastic paraplegia with exaggerated knee jerks and left ankle clonus. Other symp-

toms were lacking as in the other two cases. Case 4 was a boy aged sixteen, who developed spasticity of the legs at the age of five, with exaggerated knee jerks and ankle clonus, without other disturbances. Case 5, a boy of eleven, became spastic in his legs at three years of age with active knee jerks and slight ankle clonus, without other symptoms. Case 6, a man of fifty-one, was well until his fourth or fifth year when he became spastic in his legs. The knee jerks were exaggerated but there were no other disturbances. Case 7, a female, began to show spasticity at seven years of age, with exaggerated knee jerks and ankle clonus without other symptoms. Case 8, a boy of seven, became affected in the sixth year with exaggerated knee jerks and slight ankle clonus. Case 9, a child of two, showed spastic tendencies from his earliest efforts to walk. The knee jerks were excessive but there was no ankle clonus. Bayley called attention to a noteworthy feature of this family, the fact that "the escape of an individual from the affliction seemed to confer immunity upon his or her descendants, the affection travelling in direct and not in collateral lines."

Tooth described a case of family spastic paraplegia in two brothers. The first case, a man of twenty-nine, was well until fifteen years old, when the legs became rigid and the speech stammering. The knee jerks were exaggerated but there was no sensory disturbance, ataxia or eye symptoms. There was, however, slight incontinence of urine. History of nervous disease absent. Second case, a man of twenty-four, at the age of fifteen developed weakness and cramps in the legs and stammering speech. The knee jerks were exaggerated but there were no other symptoms.

He described also the disease occurring in two brothers in another family. Case 1, a boy of twelve, always backward, began to be spastic in his legs at nine and a half years of age. The knee jerks were exaggerated, the speech was slow and he dribbled. There was some sphincter disturbance. The second case, a boy of thirteen, showed disturbance of gait after an attack of scarlet fever at two and a half years of age. The gait was spastic, the knee jerks exaggerated and there was slight ankle clonus associated with slight sphincter troubles. The patient stuttered, but his intelligence was better than his brother's.

Jacoli (79) described a family of seven, five of whom were afflicted. The first case, a girl of seventeen, began to be stiff in her legs at the age of seven. There was a slight hypoglossal disturbance and the arms were unaffected except for a slight weakness of the fingers. There were contractures of the legs, and the patellar

reflexes were exaggerated, there was foot clonus and the brachial triceps reflexes were present. Case two, a boy of thirteen, showed first symptoms at five years of age. The third case, a girl of twenty-four, showed merely an awkward gait with active patellar reflexes. Fourth case, a man of twenty-three, was obliged to use crutches. All reflexes were tremendously exaggerated. Sensibility was normal. Case five, a man of twenty-nine, developed the disease at seven years of age. The knee jerks were exaggerated and there was marked ankle clonus and the sensation was normal.

Schultze reported three cases of spastic rigidity in the legs in two brothers and sisters. There was no antecedent history of paralysis or similar affection in the family. The oldest child was normal. The patients, aged six, five, and two years of age, all showed some abnormality at the time they were learning to walk. Speech and intelligence were normal and the arms were not involved. No bladder or sphincter disturbance. Foot clonus was present, and sensibility normal.

Kollarits (80) reported a further case of the family described by Jendrassik. The child was born at term without dystochia. At three years of age she began to turn her feet inward and at six years of age, at the time of the report, she had kyphosis, heavy gait, walking with feet apart and a slight motion of the pelvis and having pain in the back when walking. The tendon reflexes were absent, sensation was normal; deglutition and mastication good; muscular strength intact, no wasting of the muscles and the sensibility was normal.

Gabbi described three members of a family with spastic paralysis, a woman of nineteen, and her two brothers, aged eighteen and nine years respectively, all having the same symptoms. There were many members of the family who were insane, but the parents showed no nervous symptoms: G. O., a boy of eighteen, normal birth, walked at the twenty-seventh month and talked at three years, began at five years of age to be spastic in his legs with lowered power. Tendon reflexes were exaggerated and foot clonus present. No sensory or vaso-motor disturbances or atrophy.

Krafft-Ebing presented three members of one family, a female of eleven, a male aged six, and a male aged fifteen, with negative family history. The first case, a girl of eleven, normal at birth, began at five years of age to be weak and progressively rigid in the legs. Reflexes increased but no foot clonus. Normal sensation and the upper extremities intact. In the second case, the onset was at 3, otherwise the symptoms were as in the first case. Third case,

a boy aged fifteen, always had a weakness of the legs and slid along the ground with the knees extended until five years of age, and became spastic at ten years of age. On examination slight nystagmus, arched kyphosis of the thoracic and lumbar regions and slight right scoliosis. When walking there was a tendency to cross legs, reflexes exaggerated, active and passive movements of the knee joints impossible, somewhat undeveloped musculature of the lower leg, and no other symptoms.

Strümpell (81) reported the cases of two brothers, who presented typical spastic spinal paralysis in one and multiple sclerosis in another. In the first case, a man aged fifty-eight, no family history could be obtained. The gait was rigid and unsteady in a man of low intelligence. There were scanning speech, slight tremor of the head, increased tendon reflexes, rigid legs. Sensation and arms intact. Second case, a man aged fifty-six years, had epileptic attacks since youth, although not recently. Spastic gait followed a fall, after which he was apparently not injured. The arm reflexes were increased but otherwise normal. The legs were rigid and tendon reflexes exaggerated with normal sensation. A third brother suffered from rheumatoid arthritis. The second patient died from tuberculosis. An examination of the spine showed a primary disease of the lateral pyramidal tracts, and to a less degree the cerebellar tracts and Goll's tracts, symmetrically, pointing to a primary condition.

Strümpell (82) published later (1893) another case in a man of sixty-one, whose grandfather had been lame for a number of years and whose father and two paternal uncles had had the same manner of walking as the patient himself. One brother was lame three years before his death, having a peculiar walk. The patient, aged sixty-one, showed symptoms at fifty-four years of age which consisted of a spastic condition of the legs with exaggerated tendon reflexes without tremor of the tongue or muscular atrophy. Sensory changes were manifested, especially temperature changes in the legs towards the end of life. Autopsy: Typical degeneration of the pyramidal tracts especially in the thoracic and lumbar region, and slight degeneration in Goll's tract which disappeared in the middle thoracic region were present. Ganglion cells were normal and cerebellar tract was, if at all, only slightly affected.

Naef described a case in a boy aged five years, whose maternal grandmother died of a nervous disease, being unable to walk. The disease in the boy began at two years of age, and consisted of trembling of the limbs, and at six months spasticity developed. The

feet were in equino-varus position, the legs adducted and slightly flexed, and the knees hyper-extended. The arms were not affected. The mental condition was not implicated. A brother developed similar symptoms at eight years of age, and another brother presented similar symptoms. The parents were cousins.

Cafiero described a family consisting of a man of forty-one years, and his son of twelve years, who had spastic gait. The first patient, a man of forty-one, with an inebriate father, no syphilis, at thirty-seven began to be weak and spastic in the legs. The son, aged twelve years, attempted to walk first when two years old, but the gait was always spastic.

Morquio reported two cases, brothers, aged ten and five, with inebriate father and hysterical mother. One child in the same generation who died of meningitis presented similar symptoms. Both patients were born at term, with normal labor. In both, the affection was limited to the legs and there were no mental disturbances. Tendon reflexes exaggerated and Babinski positive in older. Symptoms developed at twelve and fourteen months of age.

Moore (84) presented two brothers, twenty-four and twenty-six years of age, who developed spastic paresis at fifteen. Arms, sphincter, intelligence, and vision normal. No nystagmus.

Melotti and Cantalamessa described two brothers and a sister. The maternal grandmother had some disturbance in walking similar to the sister. Two of the children of the same generation were still-born. One daughter died at thirty-five years of age, having been afflicted with weakness of the legs and difficulty in walking; in walking she dragged the right foot. Three other members of the family showed exaggerated reflexes in the arms and legs. The first case, a man of forty-four, had difficulty in walking from his early childhood and this became progressive at the tenth year. There was spastic paraplegia together with some exaggeration of the brachial reflexes. The second, a man of forty years of age, began to have difficulty in walking when he was twenty years of age, which went on to rigidity of the legs. Intelligence was defective. There were some exaggerated reflexes of the arm. The third case, a woman of forty-two, with good mentality, developed spastic paraplegia after an attack of influenza and bronchitis. The tendon reflexes were exaggerated.

Cafiero reported a family in which the symptoms extended over three generations, a father, three sons, a daughter, and her child. The father, aged seventy-two, with a negative family history, began to have at the age of five years, after extensive burns on his back,

a gradually progressive spastic paraplegia. The arms were not involved. The leg reflexes were exaggerated and there was positive Babinski. The muscular tone was reduced, and mentality was normal. His daughter, aged twenty-six, presented slight spastic gait. The patellar and Achilles reflexes were active but there was no Babinski. Her son, three years old, born at term with normal labor, first attempted to walk at twenty-six months old, but was never able to walk without support. Romberg sign was present. The deep reflexes of the legs were exaggerated. There was Babinski, ankle clonus, sphincter trouble and disturbance of the intelligence. The third child, the son of the first case reported, aged twelve years, began to walk at two years, but always stiffly and with a spring. There was slight hypertrophy of the left leg muscles. The arms were unaffected. The deep reflexes of the legs were active and there was positive Babinski.

Schönfeldt described three members of a family all manifesting muscular rigidity, paresis of the legs, exaggerated tendon reflexes and positive Babinski sign. One sister, aged eighteen, had, however, uncertain and swaying gait and became decidedly cerebellar ataxic. Her speech was explosive and there was bladder disturbance and sensory involvement. The eyes were normal. He suggested that the cases presented a congenital combined system disease of the spinal cord.

The three brothers were eighteen, ten, and six years respectively. The oldest child was normal mentally and showed no involvement of the upper extremities, sensory disturbances or atrophy. The second case, aged ten, was normal up to four years of age, when after a severe attack of typhoid fever abnormality in gait developed. The intellect was normal and the arms were exempt. The child walked on her toes, dragging them along the ground. The tendon reflexes of the legs were exaggerated and the Babinski phenomenon was positive. The third case, aged six, developed similar symptoms at three years of age. He stated that the differentiation from Little's disease presented some difficulty.

Jendrassik reported three families. In the first the parents were well and not related. Mother had a swaying gait and the paternal grandmother had a heavy gait. The patient, eight years old, born at term with normal labor, walked at two, but the gait was never good. On examination the gait was hypertonic, toes dragging and turning inward and the body swayed to and fro. The patellar reflexes were exaggerated, and foot clonus was present. Mentality good and no other symptoms. A sister at one time

showed a gait not just right, but normal at the time of examination with the reflexes exaggerated.

Jendrassik reported a family consisting of a boy of twelve and his sister of eight, with a negative family history. Symptoms began in the boy between seven and eight years of age. He had divergent strabismus, nystagmoid movements, monotonous nasal heavy speech, upper extremities normal and feet in equino-varus position with plantar concavity marked. The patellar reflexes were exaggerated but foot clonus not obtainable on account of muscular contraction. Mentality was low. His sister began at seven years of age to have her first symptoms and speech disturbances followed later. Nystagmoid movements when looking to the left, speech as in brother, upper extremities normal, legs rigid. Gait was spastic and the knee jerks were exaggerated. Foot clonus and active Babinski present. No sensory disturbances. The third family consisted of two children, a girl of eighteen, normal until ten years with family history negative. After an attack of scarlet fever, the gait became affected. At present strabismus, optic atrophy, upper extremities normal. Feet in pes varus position with toes turned in and plantar concavity marked. Gait spastic and knee jerks increased, positive Babinski. Sensation normal, mentally bright. The sister aged ten showed onset at nine years of age; uncertainty of gait, optic atrophy and legs rigid. Feet turned inward as she walked, exaggerated knee jerks and foot clonus. All other reflexes were normal and sensation unaffected.

III

In a few cases only the rigidity extended to the arms and there was associated in some, as in my own case, mental failure.

Mann reported two sisters, fifteen and thirteen years old, with negative family history, in which there began at the eleventh year of age a difficulty in walking. Mentality in one was backward. The eye examination was negative. The legs were contracted; the feet in an equino-varus position, and the toes flexed dorsally. There were clonus and exaggerated patellar reflexes and positive Babinski. Sensation normal. The arms were held in flexed position. The gait was pareto-spastic.

Raymond and Souques's cases were two sisters, nineteen and fifteen, conceived while father was intoxicated. Maternal grandfather died insane and paternal grandfather was a drunkard. J., aged nineteen, normal birth, no convulsions, at nine years of age developed difficulty in walking, and rigidity. Knee jerks exag-

gerated, no clonus, slight dorsal scoliosis, arms slightly rigid with exaggerated reflexes. Some spasm of the neck and twitching of the face muscles, otherwise normal. Second case, a girl aged fifteen, developed at the twelfth year weakness of the legs which gradually went on to a spastic rigidity. Knee jerks exaggerated, arms unaffected and no other troubles. Cyanosis in the extremities present in both.

Bischoff (85) reported two cases in brothers beginning with rigidity of the legs at the age of ten. The rigidity extended then to the arms and mental symptoms developed later. Pathologically there was dilatation of the lateral ventricles, partial degeneration of the crossed pyramidal tracts and the columns of Goll, and diminution in the number of nerve cells of the anterior horns.

Chugunow described two cases, a girl of seventeen and her brother of thirteen, with a negative family history. The girl, born at term with easy labor, developed at the eighth or ninth year some depreciation of mentality. At twelve years of age there developed a marked pareto-spastic gait and heavy and awkward movements of the arms. The skin reflexes were marked, bilateral Babinski was present, the deep reflexes were exaggerated and there was an intermittent ankle clonus. The speech was slow but not scanning and the mentality was defective. There were no sensory changes. Nystagmus movements were present. The boy, aged thirteen, normal birth, progressed slowly at school. At eleven years of age showed distinctly spastic gait. The deep reflexes were increased in the legs and normal in the arms. Bilateral Babinski was present and some clonus. There were no sphincter or sensory disturbances and the arms were not involved. There was an incipient optic atrophy and nystagmus. Speech was normal and the mentality was somewhat higher than the sister's. There was a weak Wassermann reaction in the mother and both children.

In the cases which Raymond described the arms were affected but the mental condition was normal. A boy of fifteen suffered from spastic paraplegia whose father and sister of eighteen were similarly affected. The patient developed rigidity of the legs at eight years of age. At his twelfth year his upper extremities became involved and his head showed a tendency to deviate to one side. Intelligence was normal.

IV

A number of cases collected (reported by twelve observers) presented cerebellar symptoms, Romberg sign, strabismus and nystagmus, in addition to the spastic paraplegia.

Lawrence (86) presented the cases of a brother and a sister with negative family history. The symptoms began in the boy at fourteen, and in the girl at sixteen years of age. There was spasticity and rigidity of the legs and exaggerated patellar reflexes, ankle clonus and Babinski phenomenon. The boy showed some Romberg symptoms and in both there was lateral nystagmus. The boy also showed scanning speech and mental deficiency.

Pauly and Bonne described the cases of three brothers, aged twenty-six, twenty-three, and six years of age. The heredity was negative. The onset in one appeared with nystagmus, in another with a spastic gait, and in the third with inebriate gait. The gait in all three was spastic, and in one also inebriate. Romberg sign or ataxia was absent. Intention tremor, defective speech, nystagmus appeared later. The arms were unaffected, except as to tremor. The speech was nasal and monotonous. The patellar reflexes were exaggerated, and clonus was present. No sensory disturbances or mental change, except in the oldest of the patients, who was below the average mentally. The pupils showed some atrophy.

Ganghofner cited the case of a girl of three, who was well until one year old, when weakness and tremor of legs appeared. Talked at two years. She was intelligent, had scanning speech, ataxia of the arms, exaggerated knee jerks, slight foot clonus, and uncertain gait. A brother of six, never able to walk properly, could not stand alone until three years of age. Speech developed at six years of age. There was convergent strabismus, the arms were awkward and showed some tremor. No exaggeration of the reflexes. The gait when patient was supported was uncertain and swaying with rigid knees and slight spasticity. Patellar reflexes were exaggerated and there was slight foot clonus.

Lorrain cited the case of a woman of thirty-six, who had difficulty in walking since her tenth year. Her feet rotated inwards, she tired readily, the reflexes were exaggerated, and there was incontinence of urine. Her son, aged thirteen, born at term without accidents, could only say a few words up to his fifth year. He had nocturnal incontinence until his eleventh year. Unsteady gait since early childhood. The feet showed a marked plantar concavity with first phalanges of the toes in extension and the last in flexion. Knee jerks were increased, no foot clonus, arms intact. No sphincter or sensory troubles. Mentally slow.

He reported another case of a woman of twenty-six, whose maternal grandfather had stiffness in his legs with disturbances of walking in the last years of his life. A maternal granduncle was

similarly affected. Her mother began to be stiff in her legs at thirty years of age, leading to total incapacity. The arms became affected. There was some intention tremor, speech was affected and difficulty in swallowing was noted. The mother's sister was similarly affected. The patient became affected at eighteen years of age, and developed a weakness with difficult and drunken gait associated with rigidity. The arms became affected later and there developed embarrassment of speech. There was no sphincter trouble or pain. The deep reflexes were exaggerated. The gait was spastic and staggering. The arms were rigid but no intention tremor. Upper reflexes were slightly exaggerated. Speech explosive but not scanning. No swallowing trouble. Mentality good. No horizontal nystagmus. His sister, aged thirty, developed, eighteen months previously, after curettage, difficulty in walking, consisting of a tendency to dragging gait when she was fatigued. Feet show a tendency to pes varus. Knee jerks much exaggerated. Upper extremities normal. Speech, intelligence and sphincters and sensation normal.

Kollarits described a family in which two brothers were afflicted with nystagmus, intention tremor, cerebellar ataxia, spastic phenomena, exaggerated tendon reflexes, stuttering speech with remitting progress. In one there was also arteriosclerosis, intermittent lameness, and sphincter disturbances, contraction of the right hand with sensory disturbances. The onset was at four years of age in both. The Babinski phenomenon was present in one. Stereognostic sense was reduced in one.

Raymond and Rose reported a case which they claimed served to support the theory that there existed a nervous disease of a family type intermediary between spasmodic paraplegia and hereditary cerebellar ataxia. The patient was a man of twenty-five, exhibiting typical spastic gait. Most of his movements were incoordinate, especially those of the upper arms. *Adiadochokinesis* was present and there was left oculomotor paralysis. The mentality of the subject was low. The patient's brother died at thirty-five, of a disease which suggested *tabes*. The symptoms began with the patient at fifteen years of age. The first member of the family to be affected was the boy's paternal grandmother, who at the age of twenty-five developed locomotor troubles, corresponding to those exhibited by the patient. The subject's grandfather developed the symptoms at twenty-five years of age. He also developed a persecution mania which lasted until the end of his life. He had one son, the father of the patient, who developed the same disease at

the age of twenty-four. The second son was similarly affected at the same age. A daughter developed, at the age of thirty-one, a progressive amblyopia, from which she recovered, and in her forty-second year had disturbance in walking. She exhibited cerebello-spasmodic gait, and could not stand with her legs together and her eyes closed. She showed slight ataxia of the left hand and horizontal nystagmus. Her intelligence was normal.

The fourth child, a daughter, at the age of forty-five presented nothing abnormal. This condition does not differ from the hereditary cerebellar ataxia, for both diseases present nystagmus, scanning and explosive speech and cerebellar phenomena, the difference consisting mainly in the fact that sometimes the spastic and sometimes the cerebellar disturbance dominates the picture.

Pelizzi presented three brothers with alcohol and syphilis in the ancestry; insanity and alcoholism in a cousin, and history of prostitution in two maternal grandaunts. The parents were first cousins. The mother was pregnant nine times and aborted twice. One child died two days after birth and two in early infancy. The disease began at the fifteenth year of age in all three cases. In the first case, the seventh child, spastic symptoms appeared in the fifteenth year of age; at nineteen, mental deterioration made its appearance and a year later he became violent, showed verbigeration and other signs resembling dementia præcox. The second case, the youngest child, was mentally deficient since infancy but developed spastic symptoms at the fifteenth year of age. The third case was the oldest and was developed normally except for mental deficiency, which became apparent in early infancy. The spastic symptoms appeared at fifteen years of age. At twenty, psychopathic symptoms developed, consisting of incoherence, violence, verbigeration lasting four months, to reappear at the end of a year. He died at twenty-five years of age, at which time the legs were in rigid extension, the feet in an equinovarus position, the deep reflexes were exaggerated and foot and patellar clonus were present. The gait was cerebral-ataxic as well as spastic. There was incipient muscular atrophy.

A few cases have been reported in which bulbar and pontine symptoms were associated with the spastic paraplegia, as in the cases of Archard and Fresson, and Jendrassik.

Ballet and Rose described two members of a family, brother and sister, affected with spastic paraplegia associated with spinal and bulbar symptoms. Another sister, since dead, was similarly affected. The father of the patient at forty-five developed some tremor in the

legs and some difficulty in standing. Case 1, a male of twenty-nine, developed the disease at seventeen years of age. His speech was indistinct and embarrassed, he could not protrude his tongue and the gait was ataxo-spasmodic, the patellar reflexes were exaggerated and the Babinski sign positive. The sphincters were normal and there was no Romberg sign, ataxia or paresis. The legs were markedly spastic and the intelligence was slow. Aside from exaggeration of the arm reflexes, the upper extremities were uninvolved. Later there developed facial paralysis, tremor of the lips, involvement of the masseter muscles with marked contractures in the arms. There was no ataxia but intense adiadochokinesis. The eyes refused to follow an object from right to left. There were some spontaneous movements of the eyes. The second case presented tremor of the arms and slight ataxia. The muscular force in the arms and legs was good, but there was a slight contracture in passive movements. All tendon reflexes were exaggerated. He walked slowly, holding the right leg somewhat stiffly. The intelligence was slow. Sensibility and sphincter control were normal. At her eighteenth year she suffered from hallucinations of persecution.

Giovanardi reported three cases of senile spastic paraplegia, the subjects being a sister, aged seventy-three years, and two brothers, aged seventy and sixty-six years. The onset in the sister appeared at seventy-one years and consisted of typical spastic gait and athetosis of the toes, exaggerated deep reflexes, vesical disorders, and pseudo-bulbar symptoms. Memory, speech and intelligence unaffected. The men presented similar symptoms.

Bernhardt reported the cases of three brothers, with spastic spinal paralysis. The parents were healthy and no consanguinity. Two nephews of the patients were idiots. The third brother died at sixty-one, having had a defective gait and disturbances of speech. The three brothers developed the disease at the thirtieth year, consisting of a progressive paresis of the legs, muscular rigidity and exaggerated reflexes. In one of the cases, nystagmus, speech disturbances and dysphasia developed. The third case was not examined by the authors.

Dreschfeld described two cases occurring in the same family. The first case was eight and three fourths years old, and was well until fourteen months old when nystagmus and weakness of the legs appeared, following two attacks of convulsions. The boy could neither walk nor stand. He had a vacant stare; the fundus was normal; nystagmus was present; the speech scanning, and there was glossopharyngeal paralysis. There was also paresis of the arms

which were the seat of a marked tremor. The legs were paretic. No muscular atrophy, and sensibility and sphincters were normal. There was marked clonus. The second case, seven years and four months of age, was normal until the fourth year, when unsteady and tremulous gait developed. No history of convulsions. Ataxia symptoms were well marked.

Modena described three members of the same generation affected with spastic paralysis. The disease made its appearance at the seventh year, consisting first of contraction of the little finger on the left hand in two of the subjects and on the right hand in the other. Then there developed contractures and paralysis of the arms and legs. Two of the cases presented involvement of the facial and hypoglossal nerves and in the third case there was partial involvement of the oculomotor nerve. There was no sphincter or optic nerve disturbance. The muscles of the hands and feet were atrophic and there was a marked diminution of electric excitability. There were no convulsive tremors, nystagmus or pain. The mentality was reduced and there was anarthria. The study of the patellar reflex could not be made on account of the contractures.

Delarde and Minet cited a case of a girl of three and a half years of age who developed, at two years of age, difficulty in walking and standing and dropped things when attempting to grasp them with her hands. Later speech troubles began, and finally the legs were spastic, the arms slightly contracted, the speech thick and embarrassed and there was occasional difficulty in swallowing. The tendon reflexes in the legs were exaggerated and slightly so in the arms. Sensibility and sphincters were normal, but later the intelligence became affected. The father had a tremor of the arms and three other children in the same generation presented the same symptoms as the patient. Another one had chorea and still another suffered from convulsions.

VI

In a few cases the spastic paraplegia is associated with muscular atrophy. Modena has reported a case already cited, in which atrophy of the hand muscles was present, and Hochhaus described atrophy of the lower leg in one case previously described.

Pesker (87) described a sister and brother with complete spastic paraplegia; muscular atrophy of the leg, intention tremor of the hands and head and nystagmus. At the autopsy there was found retarded development of entire fiber system of the spinal cord including complete obliteration of the cerebellar and lateral pyramidal

tracts, with almost complete disappearance of Clarke's columns. There was no sclerosis.

Holmes described two cases in the same generation of family spastic paralysis associated with amyotrophy. A first cousin of the father presented similar symptoms, although it was probably in this instance a case of cerebral diplegia. The patient, aged fifteen, began to show difficulty in walking when she began to walk in her second year. Wasting of the muscles was observed at five years of age. Speech was always unnatural. There was irregular nystagmus on looking to the right. Some rigidity and weakness of expressional and volitional facial movements was present. The tongue was protruded slowly and awkwardly and was spastic while the articulation was monotonous, toneless and nasal. There was slight rigidity of the shoulder and elbow joints and a wasting of the hand muscles and the muscles along the ulnar border. There was wasting of the calves and anterior tibial muscles and they felt abnormally firm and tough. Both legs were stiff and the gait was typically spastic. Electrical stimulation was lowered in the hands. All tendon reflexes were exaggerated; but no clonus could be elicited due to the contractures. There were no sensory disturbances and the mentality was good.

The second case, a child aged thirteen, began to walk at fourteen months old but never walked well. There was no nystagmus or otherwise anything abnormal about the eyes and the facial expression was vacant. The extensors of the wrist were weak, and there was atrophy of the hand muscles but no definite local wasting in the hands and feet. Electrical changes were present in the hands. The legs were slightly rigid and the movements were weak. The gait was spastic, the tendon reflexes exaggerated in both legs, the patellar clonus was readily obtained but there was no ankle clonus.

Gee described hereditary infantile spastic paraplegia occurring in a man and his daughter and son. A maternal aunt was completely paralyzed and two maternal cousins were deaf mutes and one was born without fingers. The patient himself had never been able to walk properly. There was some wasting of the anterior tibial muscles with impairment of electrical reactions. The knee jerks were increased but there was no ankle clonus. The second case, his daughter, did not walk until she was between two and three years of age and never really walked properly. The patellar reflexes were increased. The small hand muscles were wasted and the thumb was adducted. The electric reactions were good. The third case, the son, aged eleven, walked pretty well at the age of

two, and until he was three years of age, when after an attack of whooping cough he began to be spastic in his legs. The knee jerks were marked but there was no ankle clonus. The elbows were slightly rigid and the hands were held in a cramped position. Electrical reactions good.

Seligmüller described four cases of spastic and atrophic manifestations in one family. The patients were aged eight years (girl), ten years (girl), six years (boy), and fifteen months (girl). The disease began in each case at 9 months of age and went on to a complete spastic paralysis associated with high-grade muscular atrophy and in two cases accompanied by impaired mobility of the palate, lips and tongue with associated defective speech.

In one of Hochhaus's cases there was atrophy of the lower legs. In the other two cases in the same family the symptoms were of the pure type of spastic paraplegia. In one of Pelizzi's cases already quoted there was incipient muscular atrophy.

There are two references in literature in which the spastic paralysis occurred in some members of the same family, others of whom presented pseudohypertrophic paralysis.

It was slight and present in one calf muscle in the case Cafiero previously cited.

Philip described a primary spastic paralysis and pseudohypertrophic paralysis in different members of the same family. The patient and his two sons were afflicted. His father died of apoplexy but otherwise the history was negative. In his wife's history there was a record of a cousin having been paralyzed for eighteen years and an uncle who was paralyzed for a number of years. They had nine children, three of whom showed symptoms of pseudohypertrophic paralysis and one symptoms of spastic paralysis similar to that from which the patient himself suffered. These symptoms consisted in the father of a gradual motor weakness and rigidity of the legs but no sensory disturbance. His son, aged eleven, presented evidence of a similar affection. He was born after his father developed the spastic symptoms.

Chugunow cited two instances occurring in a girl of nine, and her brother of seven, the parents of whom were related. The mother was an epileptic. There was one other child, a boy of fourteen, who suffered from the disease. He developed the disease at the age of five years. Labor in all three cases was prolonged and the children were asphyxiated. At the age of four, both patients developed rigidity in the ankles and knees with some wasting in the muscles of the calf. The gait was spastic and the feet

were held in an equinovarus position on both sides. The electrical reactions were normal. Marked loss of power in the lower legs. There was some muscular rigidity in the arms as well. All the reflexes were increased. There was bilateral Babinski and ankle clonus in the boy, but these could not be developed in the girl on account of the rigidity. The sphincters were normal and the mentality weak.

Jendrassik cited three cases of muscular contraction and absence of tendon reflexes in a man of thirty, and two children of his sister, a boy and a girl, aged twelve and nine respectively. J. V., the first case, aged fifty, never walked naturally. At fourteen years of age, the affection extended to his arms. At the time of the examination he had slight compensatory scoliosis. Passive movements of the arms were restricted. The arms were atrophic especially the left. The forearm musculature was rather powerful. The calves thin and rather harder to the touch than the thighs, which were developed but showed a restriction of motion. The feet were held in an equinovarus position. All tendon reflexes were wanting. There were no electrical changes or sensory or other changes. Joseph, aged twelve, his nephew, born at term with easy labor, soon after learning to walk at one year of age, showed a tendency to defective gait. At five years of age he stood only on his toes. Gisela, aged nine, was well until seven years of age, when she developed the same disease as her brother. The patellar reflexes were weak and later the arms became affected.

(To be continued)

Society Proceedings

THE PHILADELPHIA NEUROLOGICAL SOCIETY

MARCH 24, 1916

The President, DR. FRANCIS N. DERCUM, in the Chair

Dr. William Drayton, Jr., exhibited a case of pellagra in a child of twelve years of age.

Dr. Augustus A. Eshner said it would be exceedingly difficult to say that Dr. Drayton's case was not one of pellagra. He could see no good reason why a certain measure of recovery should not take place in a given case of pellagra; why, for example, the cutaneous manifestations should not disappear, while the changes in the nervous system persist as they seem to have done in the case exhibited.

PROGRESSIVE MUSCULAR ATROPHY OF SCAPULO-HUMERAL TYPE

By Alfred Gordon, M.D.

Woman of 33, housekeeper, began to notice about two years ago a gradually oncoming difficulty in raising her right arm. There was no pain. Soon she noticed her right fore-arm began to get thinner.

On examination a wasting of the musculature of right supraclavicular and infraclavicular regions is found. The trapezius on the right is not sufficiently contracted when it is in function. The muscles on the right fore-arm are smaller than on the left. The muscles on the right scapula are thinner than on the left side. The arm cannot be raised above a horizontal line and then the angle of the scapula recedes from the thorax, so that a hand can be inserted between the scapula and thorax. The head of the humerus is found in the axilla. This dislocation took place without the patient's knowledge and consequently without pain. The last two fingers of right hand are not on the same level as the other fingers, consequently there is some weakness in the extensor muscles supplying these two fingers. Grip of the right hand is weaker than that of the left hand. There is also a flattening of right pectoral muscles. The biceps on the right is weaker than on the left side. The biceps and triceps reflexes are not obtainable on the right side. Von Bechterew's reflex is more marked on the right than on the left side. Electrical reactions of the affected parts show only diminution of response, but no reactions of degeneration. Considering the slow onset, slow development, it is to be presumed that it is a case of progressive muscular atrophy of scapulo-humeral type.

The Wassermann reaction being negative and no infectious disease having preceded the onset of the atrophy, the etiology remains obscure.

Dr. Gordon replied to questions that there was no involvement of the face. It was perfectly normal. The electrical reactions were tested and only a diminution of response to faradic and galvanic currents was observed.

CONDITION IN HAND RESEMBLING FROST-BITE

By N. S. Yawger, M.D.

The patient, a brakeman, 31 years of age, had had a severe frost-bite of the right hand more than three years before. Two months subsequent to exposure there developed severe pain which persisted for six months but with no other symptoms. Then followed a period of two years with freedom from all manifestations. At the end of that time slight exposure caused a reappearance of symptoms in the form of pain and swelling and this was followed by the development of ulcers. There were eleven of these and from these two depressed cicatrices remained.

Palpation revealed a slightly lower temperature in the affected hand. The radial pulse could but seldom be made out although the artery was readily outlined because of its sclerosis. The ulnar artery was similarly affected. There were no changes to pain, touch and temperature sensations.

The Wassermann test in the blood was negative.

Cervical rib was ruled out by rentgenogram study. Raynaud's disease was considered, but there had been absolutely no symptoms in the affected member previous to exposure and no other part of the body had been involved. The condition appeared to be due to frost-bite and subsequent exposure to cold.

The question has often been raised in frost-bite as to whether the damage is greater to the bloodvessels or to the nerves. The clinical findings in this case were all in favor of the former. In this connection it is recalled that recently English investigators, working experimentally upon trench frost-bite, made microscopic studies of the vessels and nerves; they likewise found that the injury sustained to the former was much greater than to the latter.

Dr. Dorrance said this case seemed to be one of marked localized arteriosclerosis following a frost-bite. Dr. Yawger asked him to see the case in regard to the advisability of performing the operation of reversing the circulation to overcome any tendency to gangrene. This case is similar to those one sees among the Russian Jews where there is marked arteriosclerosis of the vessels of the foot. In these foot cases as well as in those like the one presented at this meeting, the reversal of the circulation is unsatisfactory. The vein does not take up the work of the artery, the arterial blood which is forced into the vein does not descend to the extremity but ascends the limb through the first tributary of the vein. The coagulation time in this case was six minutes, in chilblain the time is much less. The pain in the acute exacerbation of this condition is frequently relieved by the administration of calcium salts.

Dr. G. E. Price said he had been very much interested in Dr. Yawger's case. He recently had an opportunity of studying sections of a case of amputated leg of Raynaud's disease in which vascular and nerve changes were present. The surgeon advanced the theory that the changes were secondary to the congestion in the nerve. Study of sections showed no marked degeneration anywhere.

Dr. Dercum said he would like to ask Dr. Dorrance whether he thought this case could be benefited by the Bier method of treatment, that is, putting the hand in a vacuum apparatus.

Dr. Dorrance replied that the vacuum might be beneficial.

TUMOR CAUSING BRACHIAL AND SYMPATHETIC PALSIES

By F. X. Dercum, M.D.

F. C., male, aged 33, married, native of Pennsylvania, boiler-maker by occupation, was admitted to the Jefferson Hospital on March 9, 1916, complaining of a burning pain in the right side of the neck and chest and of swelling in the right arm and shoulder.

Family History.—Father, mother, brother and two sisters living and well. None dead. No history of cancer or tuberculosis.

Personal History.—Cannot recall any diseases of childhood; no other diseases. No venereal infections. No injuries or operations. Does not use alcohol or tobacco. Has been married three years, no children. Wife has had two miscarriages.

Present Illness.—Was well until January 7, 1916. Then felt a pain in the right upper chest and numbness in the right arm and back. This pain recurred, became worse and finally continuous. At first it was most marked during the day, but later became most marked at night.

About six weeks previous to admission the arm began to swell and the swelling has gradually increased. The arm has also become weaker and for some weeks past he has been unable to grasp objects with the right hand. For three days past he has been unable to move the arm at all. The latter feels heavy and numb. For the last two weeks he has also noticed a "drooping" in the right eye. No general symptoms.

Condition on Admission.—Fairly well nourished and well developed. Complexion rather sallow. Mucous membranes rather pale. Right arm much swollen and in a condition of flaccid palsy. Upper portion of right side of chest evidently enlarged and distended. A marked and resistant swelling is also noted above the clavicle. The apex of the chest is flat to percussion as low down as the fourth rib and indeed somewhat below. Sensation is much diminished in the arm to all forms but not lost; the hypesthesia is most marked over the ulnar and inner aspects of the hand and forearm.

It is noted also that the right eyeball is retracted, that the palpebral fissure is narrowed, that the pupil is small and that it reacts very little to light. The left eyeball, palpebral fissure and pupil are normal.

Otherwise the neurological and general visceral examinations are negative. The urine was likewise negative. The blood revealed hemoglobin 78 per cent., red blood cells 4,720,000, white blood cells 26,200. Of the latter 85 per cent. were polynuclear, 13 per cent. lymphocytes, and 2 per cent. hyaline. The red blood cells varied in size and stain. Wassermann negative.

An X-ray examination reveals a large mass occupying the upper third of the right chest. It extends downward to midway in the fourth interspace. Probable diagnosis sarcoma.

PROBABLE DIAGNOSIS OF TUMOR OF THE PINEAL GLAND

By F. X. Dercum, M.D.

J. B., male, aged 28, single, native of Pennsylvania, white, admitted to the nervous ward of the Jefferson Hospital March 6, 1916.

Family History.—Father and mother living and well. One brother and three sisters living and well; one brother and two sisters dead, causes unknown. No history of tuberculosis or malignant disease in family.

Personal History.—Measles and whooping cough in childhood. Rheu-

matic fever at eighteen. Operation for inguinal hernia at twenty-one. No venereal diseases, no injuries, no alcoholism. Moderate smoker. As a boy got along well at school; in fact was a little ahead for his age. Attended school until he was fourteen years old; then went to work in a carpet mill. About four years ago first noticed trouble with his eyes, especially the left. He suffered from blurring and dimness of vision and this has gradually increased.

About a year ago he began to suffer from headache. This gradually became more severe and finally constant and was frequently accompanied by vomiting, the latter not associated with the taking of food. Occasionally suffered from dizziness and at times would stagger. For some months past has suffered from failing vision especially in the left eye. Memory also became impaired. Symptoms have gradually become more pronounced.

Condition on Admission.—Is short of stature (5 feet, 1 inch), light of build and immature in appearance. The skin is soft, very smooth and with considerable subcutaneous fat. Voice high-pitched and soft. Though twenty-eight years of age there is not the slightest trace of moustache or beard, the face being very smooth; there is no hair in the axilla, almost none on the pubis. The genitalia are infantile in appearance and development.

The head gives the impression as though it were enlarged and distended, especially in the occipital and parietal regions. The bridge of the nose is unusually high, the chin prominent and pointed. The eyeballs are full, while the left is rotated outward.

The face seems slightly asymmetrical, the left being the smaller. The pupils are equal; the light reaction is lessened especially in the left. No changes in station, gait or reflexes, with the exception of a doubtful Babinski sign on both sides.

The patient has a pleasant disposition, does not worry and is generally contented.

The general visceral examination is negative. Examination of the urine negative. Wassermann negative.

Ophthalmoscopic examination by Dr. Hansell reveals a double optic-nerve atrophy following an optic neuritis. There are no ocular palsies, the deviation of the globes being due to lack of fixation.

An X-ray examination revealed a shallow and flattened sella turcica, while the internal table of the calvarium was indented—and in a remarkable degree—by the convolutions of the brain. The cranium was also thinner than normal.

There was clearly present an internal hydrocephalus. The flattening of the sella turcica was evidently due to a distended infundibulum, while the markings of the convolutions upon the internal table, the enlargement of the head and the prominent eyeballs left no doubt as to a general distention of the ventricles.

When we combine these facts with those pointing to a disturbance of the internal secretions the evidence points strongly to a tumor of the pineal gland. The association of tumors of the pineal gland with precocious sexual development is well known. Cases of precocious sexual development appear to be due, as Marburg has pointed out, to a premature involution of the gland, and therefore to a hypo-pinealism. The secretion of the pineal gland seems to inhibit the development and function of both the pituitary and the sex glands, and it is only with the involution of the pineal gland—which normally takes place a little before or at puberty—that the sex glands develop and secondary sexual characteristics make their appearance. It seems reasonable to infer that if involution of the pineal gland does not take place, if it persists and still more if it undergoes hypertrophy, that hyperpinealism is established and that delay and arrest of sexual development must follow. In this light

the case presented should be regarded as one of hyperpinealism. The position of a tumor of the pineal gland is of course just such a one as would lead to compression of the aqueduct of Sylvius and give rise to a secondary hydrocephalus. The arrest of stature and the general retardation of skeletal evolution in the present case points of course to a retarded or inhibited function of the pituitary gland and is in keeping with the supposed antagonism existing between this gland and the pineal. The strange relation existing between the pineal gland and the general evolution of the organism is further indicated by the fact that pineal tumors are frequently teratomata containing hair, cartilage, fatty tissue, fat glands, smooth muscle fibers; thus revealing tendencies which Dr. Dercum believed are shared in only by the sex glands.

In connection with the above case, Dr. Dercum presented a tumor of the pineal gland which had been found in the Baugh Institute of Anatomy of the Jefferson Medical College. The brain had been in the laboratory of the institute for some time and no history of the cadaver from which it had been taken could be secured.

The tumor is a relatively large and somewhat flattened mass presenting the normal attachments and position of the pineal gland. It had not been examined histologically.

Dr. Spiller said that the diagnosis of tumor of the pineal body was an exceedingly difficult one to make, because a growth in this region disturbed the circulation of the fluid in the ventricles and caused symptoms from disturbance of function in the pituitary gland. The facts known regarding the pineal gland have been presented in a monograph by Krabbe, who shows that much is yet to be discovered regarding this body.

Dr. Dercum thought it was difficult to escape the conclusion that this boy had gross intracranial disease. He had vomiting, he had optic neuritis. That the hydrocephalus is secondary he thought very probable. Further we cannot explain away the internal secretion symptoms. The hypogenitalism must have some significance. Whether that hypogenitalism is due to secondary involvement of the pituitary, *i. e.*, inhibition by the pineal secretion, does not alter the question. If there were merely an enlarged pituitary body without the acromegalic phenomena, we would expect beside this hypogenitalism a greater deposit of adipose tissue. Dr. Dercum agreed that the symptoms were difficult to unravel because we always have to do with a disturbance of the chain of the internal secretions. However, this case cannot be a pituitary case primarily. The hydrocephalus is clearly the result of pressure upon the aqueduct.

Dr. S. F. Gilpin presented a case of paralysis agitans (?) with unusual symptoms.

Dr. George E. Price said that there were some points in this case which suggested the probability of an organic brain condition. The man gave a history of diplopia and also stated that the speech defect came on over night. There is deviation of the tongue to one side with probable weakness of one half of the face and also extension of the great toe on either side when the skin is irritated on the sole of the foot or under the outer malleolus. These points, together with slight difficulty in swallowing and a rather characteristic speech, suggest the possibility of a pseudo-bulbar palsy.

Dr. Gilpin said that the throat examination by Dr. Lewis showed the epiglottis to be in the throat like a foreign body, and he thought that might have something to do with the cough.

Dr. Samuel Leopold reported a case of Jacksonian epilepsy limited to the right upper extremity.

Dr. Cadwalader said he had seen this man about six weeks ago during

an attack exactly like the one Dr. Leopold described. It was a tonic flexion of the right forearm on the arm with some rotation of the shoulder towards the median line. Practically the Velpeau position. The man was entirely conscious. He called Dr. Cadwalader's attention to the fact that the attack was coming on. He was smiling. It lasted perhaps a minute and then the spasm relaxed and the patient appeared to be perfectly comfortable.

Dr. George E. Price said the question of the etiology of Jacksonian epilepsy recalled a case he saw in the Jefferson Hospital some years ago. The patient, a child, had convulsive attacks in one arm, Jacksonian in type. There was no evidence of hysteria, no choking of the disk. The attacks were so distinct that he advised operation and much to Dr. Price's chagrin when the opening was made over the arm center absolutely nothing was found.

Dr. E. M. Auer read (by invitation) a paper on the phenomena resulting from fatigue and shock of the central nervous system observed in France.

Dr. Burr inquired whether Dr. Auer knew the percentage of men in the army who have either become frankly insane or who have hysteria or any other functional disturbance, whether such disturbances are any greater than occur in the population at large. It seemed to him that after all war, like any other external shock, is simply the pulling of the trigger and that the real cause is within the men themselves.

Dr. Dercum asked whether Dr. Auer's observations were made on English troops, French troops, or both.

Dr. Auer said his observations were confined entirely to the English troops. In reply to Dr. Burr's query he could not make a statement in regard to the percentage but he judged that the percentage of individuals showing manifestations of functional disorder would be greater, because individuals were exposed to conditions such as never before, and this intensive strain would make manifest neuropathic traits that possibly would lie dormant or pass unobserved in civil life.

APRIL 28, 1916

The President, DR. F. X. DERCUM, in the Chair

A CASE ILLUSTRATING THE OCCASIONAL RESEMBLANCE OF TABES DORSALIS TO DISEASE OF THE PITUITARY GLAND

By Williams B. Cadwalader, M.D.

In 1913 Oppenheim (*Zeitsch. für die Gesamte Neurologie und Psychiatric*, Vol. XXV, Nos. 4 and 5, p. 527) called attention to the fact that tumors of the hypophysis can occasionally produce symptoms that very closely resemble tabes dorsalis. He records the following case history: A man, aged 38, noticed that his vision was gradually failing in both eyes, then his sexual power diminished. An examination revealed bilateral optic atrophy, loss of the pupillary reflex on the left side, and loss of the tendon reflexes. The diagnosis of tabes was made. Re-examination, however, showed that the man was fat, especially in the face, and this adiposity had increased rapidly; that he had no hair on his face or in the axilla, and little about the sexual organs; and the mammary glands were of the feminine type. These observations led to the suspicion of disturbance of the pituitary gland. Further inquiry elicited the information that hemianopsia had existed, and this had progressed to amaurosis of the right eye and to such failure of sight in the left eye, so

that only hand movements were recognized in the left inner field. The X-ray examination showed enlargement of the sella turcica. In spite of the absence of headache, mental dullness, glycosuria and polyuria, the findings permitted the diagnosis of tumor of the hypophysis. Operation resulted fatally. At autopsy an adenocarcinoma of the pituitary gland was found. Oppenheim also reports a case of tumor of the hypophysis with symptoms that suggested paresis. The case Dr. Cadwalader presented was not unlike Oppenheim's. The notes are as follows:

Louis L. M., dispensary No. 11,724, male, aged 51 years, was admitted to the University Hospital Dispensary April 1, 1916.

The patient stated that he had been healthy, but when 24 years old he had "brain fever" and typhoid fever in 1896.

His present condition began in 1911 with diplopia, followed by failing vision, which very gradually progressed. During this time he had not been as strong as formerly, but he stated that his appetite had been extra good, he generally ate a larger amount and drank as much as one or two gallons of water daily; at one time he ate large quantities of sweets and sometimes great quantities of salt, but has recently stopped this at the advice of his physician. He thinks he has gained a good deal of weight recently. He has imperative micturition and passes large amounts of urine. There is no loss of sexual power, no severe pain. There is no nausea, vertigo or headache. The skin of the body is smooth and normal. The growth of hair in the axilla and over the symphysis is not diminished. The patient is very nervous and has a distinct tendency to drowsiness. Dr. de Schweinitz reports that vision in the right eye is 1/60; in the left eye 6/45. The pupils react to light and in accommodation. Diplopia has disappeared since vision had failed. There is a distinct limitation of upward movement in the left eye. The right eye wanders in convergence, no limitation of outward movement. There is complete loss of the right temporal field and almost complete loss of the left temporal field. The right disc is atrophic with a distinct yellowish tint. The arteries and veins are reduced in size, especially the arteries. The left disc is also atrophic but not so far advanced as is the disc of the right eye.

Dr. Pancoast made X-ray studies and found distinct alterations of the sella turcica. The patient's station is normal, there is no ataxia. The tendon reflexes are all absent. Sensation is everywhere normal. Wassermann reactions were not made.

The suggestion was offered that this case might be one of cerebral lues in which the meningitis had also affected the hypophysis, causing obesity, polyuria, polydipsia, intense hunger and increased appetite and increased tolerance for sugars; all of which are phenomena attributed to disturbances of function of that gland. Syphilitic affections of the pituitary gland, however, are exceedingly rare and Dr. Cadwalader knew of no microscopic findings to substantiate this view. Simmonds has observed disturbances of the hypophysis in a few cases of congenital syphilis and Goldstein has reported a case of tumor of the hypophysis and paresis occurring in the same individual at the same time (*Archiv. für Psychiatrie*, t. LIV, Vol. 1, p. 210, 1914). Dr. Cadwalader has observed the case of a young woman who applied at the Orthopedic Hospital Infirmary for Nervous Diseases for treatment in the service of Dr. John K. Mitchell. She was syphilitic and also complained of symptoms referable to the pituitary gland. She was exceedingly stout, her menstruation was scanty and irregular and she complained of severe headaches and intense general nervousness. The physical examination revealed nothing except a generalized tremor. The pupils were normal and vision was not impaired. There were no evidences of tabes or of lues except that the Wassermann reaction of the blood serum was repeatedly reported positive. She had also polyuria, polydipsia, a tremendous appetite and craving for

sugars. Dr. Cadwalader had looked upon this case as a possible one of syphilitic disturbance of the pituitary gland.

Dr. F. X. Dercum said he had placed a case on record of pituitary tumor in a case of tabes. The case was one of acromegaly with typical tabes.

A CASE OF ATROPHY OF THE LEFT SIDE OF THE FACE, THE LEFT ARM AND LEG, FOLLOWING AN INJURY TO THE RIGHT PARIETAL AND MOTOR REGIONS

By John H. W. Rhein, M.D.

Charles Jordy, aged 24, elevator man, applied to the Philadelphia Polyclinic Hospital, February 28, 1916, complaining of pain along the distribution of the anterior crural nerve, following an operation performed on January 24 for keloid, by Dr. Speese.

On examination it was discovered that the leg and to a less degree the arm on the left side were smaller than on the right. This wasting, he stated, followed a gun-shot wound of the cranium in March, 1905. At that time he was accidentally shot while examining a gun.

He was admitted to the University Hospital, and on examination a wound was found over the parietal and motor regions on the right side. The left arm and leg were paralyzed and astereognosis was found on the same side. The face also was palsied.

He was operated on a week after admission, the wound was explored, and two or three fragments of bullets and many hairs were removed. Craniotomy was done, and an electrode applied, but without response. The wound was reopened for drainage, and two weeks after this it was opened more deeply to permit granulating from the bottom of the wound.

On May 25 he was discharged with some weakness in the left leg, exaggerated patellar reflex, but the astereognosis in the left arm had disappeared. He began to work again in six months, after having been in bed for four months.

On April 22, 1907, at the University Hospital, examination showed no sensory disturbances or spasticity. The patient walked with a limp and some toe-drop. The peroneus group of muscles was distinctly weakened, and the anterior tibial also. The patellar reflex was more active on the left side.

The reflexes in the upper extremities were not exaggerated.

On September 9, 1912, the second toe of the left foot was amputated on account of contraction.

Dr. A. P. C. Ashhurst did a Stoffel operation, that is, he divided many of the branches of the internal popliteal nerve supplying the gastrocnemius and soleus flexors of the toes, and the tibialis posticus.

On examination at the Philadelphia Polyclinic Hospital on February 28, 1916, it was found that the left arm and leg were distinctly smaller than the right arm and leg. He was only able to move the foot at the ankle joint slightly in flexion and extension. The knee jerks were equal and slightly exaggerated. A left-sided Babinski and Oppenheim were present. On testing his ankle clonus none was obtained, but there followed the test an irregular tremor of the thigh. There was an irregular coarse tremor of the left leg, when the muscles were put on tension. Sensation was normal.

	Left Circum	Right Circum
Calf	31.5 cm.	34 cm.
Thigh	39.5 cm.	46 cm.
Arm	25 cm.	26.5 cm.
Forearm	25 cm.	26.5 cm.

On April 26, 1916, an examination showed wasting of the left side of face. The left arm was smaller by 1.5 cm. in circumference, and the left leg at the thigh was 3 cm. smaller in circumference than the right, and the calf 1.5 cm. smaller.

The gluteal muscles were distinctly wasted. There was still lowered power of extension and flexion of the foot at the ankle. No sensory change to pain, touch, heat or cold, or astereognosis was present.

The X-ray plates locate the bullet now in the posterior portion of the middle fossa just a little above the base of the brain on the right side. In view of the fact that the atrophy followed soon after the original injury, it is fair to assume that the present position of the bullet has nothing to do with the causation of the atrophy.

The cause of central wasting of cerebral origin is still a matter of discussion. Various theories have been advanced to explain it. It has been attributed to lesions of the pyramidal cells in the cortex (Senator). By some authorities the atrophy has been connected with trophic cerebral centers of the cortex or optic thalamus (Borgherini, Eisenlohr and Quincke). Saville placed the trophic center in the limbic lobe.

v. Monakow and Chatin opposed the theory that the brain possessed a trophic center for muscles in the motor region and in the central ganglia. Oppenheim also believed that this theory had no sufficient foundation.

Caracciolo removed portions of the brain of dogs and explained the trophic changes in the muscles which followed as due to the propagation of the cerebral lesion to the cells of the spinal gray matter by way of the descending fibers which degenerate, an influence which extends to the nerve and muscle fibers. These changes he demonstrated histologically.

The cerebral influence is invoked in explanation of the atrophy by Parhon and Popesco and Roth and Muratow. The action of the cerebral neurons in the vasomotor system causes the atrophy according to this theory.

Marinesco upholds the muscular origin for the atrophy. At the same time he admits that lesions of the sensorimotor zone or degeneration of the pyramidal tracts give rise to circulatory disturbances which the muscles cannot endure and they become atrophic. Goldschiefer and v. Monakow look upon the atrophy as sensorimotor, and vasomotor in origin. Chatin believes that the equilibrium of the sensorimotor reflex is disturbed.

Gaussel cited the case in which there was atrophy of one side of the tongue as well as of the paralyzed limbs. It was due, he believed, to a lesion of the internal capsule and the anterior and posterior parts of the postero-inferior thalamus.

The amyotrophy while constant is variable and is due to the suppression of the cerebral nervous influx acting on the large cells of the anterior horns, and on the vasomotor centers. (Schaffer and Marinesco and Parhon and Popesco.)

The cause is assigned to degeneration of the anterior horns by Charcot, Hallopeau and Leyden.

Pitres cited a case in which the internal capsule was the seat of a lesion and in which anterior horn changes were observed.

Mills believed that the atrophy was to be attributed to degeneration of the pyramidal tracts and involution of the anterior horns and to degeneration subsequent to peripheral neuritis occurring in the affected members. He also believed that in some instances it may be due to destruction of the trophic centers in the cerebrum.

Cases have been cited in which the anterior horns and the peripheral nerves have been normal, however, by Babinski, Quincke and Borgherini.

Dejerine has demonstrated that there may be peripheral neuritis with normal anterior horn cells.

Babinski believed that the disturbances in the anterior horns may be manifested by lesions of the nerve cell and muscle and nerve or the peripheral nerves and muscles, or finally in the muscles exclusively, the trouble being sometimes organic and sometimes dynamic.

Gowers believed that the muscular atrophy was due probably to the irritative character of the descending degeneration in the pyramidal tracts. He states that while the degeneration did not descend to the motor nerve cells when irritative in character, it seemed to affect the nutrition of the cells and nerve fibers proceeding from them, and through these the nutrition of the muscles.

Steinert reported sixty-four cases of atrophy of cerebral origin, with seventeen autopsies. He described an early change, consisting of a thinning of the muscle fiber, increase in the nuclei, and fatty degeneration with wax-like degeneration in some. Later these phenomena regressed, the structure of the fibers improved, while the fibers were narrowed with increased nuclei. Nothing was found in the peripheral nerves. In the older cases there was an atrophy of the anterior horns of the affected side.

Gaussel believes that at the present most authors admit a myelopathic or neuritic origin for hemiplegic amyotrophies.

Finally, some authorities assume an arthritic origin for the atrophy.

The case reported supports the hypothesis that the central neurons exercise a trophic influence on the musculature.

Dr. George Wilson asked might not this case fall under the head of arrested development instead of atrophy. He would compare this to the lack of development seen in infantile hemiplegia rather than true atrophy after development had occurred.

Dr. Rhein replied that the patient was only fourteen years old when this occurred and therefore still in the developmental period. The symptoms could scarcely be entirely due to lack of development as the atrophy was apparent, the patient states, shortly after the accident.

Dr. Alfred Gordon presented a case of syringomyelia.

PATHOLOGICAL FINDINGS IN TWO CASES OF PARALYSIS AGITANS

By Grayson Prevost McCouch, M.D., and E. M. Auer, M.D.

In brief the pathological changes noted in the region of the basal ganglia were:

1. Areas of rarefaction containing neuroglia cells and debris, giving the tissue a moth-eaten appearance (previously described by William G. Spiller in a case of contracture of the limbs of the right side).
2. Clean punched-out holes, possibly excessively enlarged perivascular spaces from which the vessels have dropped out (probably similar to those described by S. A. K. Wilson in bilateral progressive lenticular degeneration).
3. Round and oval basic staining deposits chiefly in the perivascular spaces and adjacent tissues (described by F. H. Levy).
4. Diminution in the number of the external medullary laminae and of the radial fibers of the lenticular nucleus with some evidence of degeneration of the latter. Similar changes have been described by Jelgersma, F. H. Levy, and others.
5. Failure of the cells of the corpus striatum to stain well, probably due to the age of the material.

6. In one case advanced degeneration of the cells of the median nucleus of the optic thalamus on both sides and of the corpus subthalamicum on one side.

THE ASSOCIATION OF SEVERE ANEMIA WITH TABES DORSALIS

By William G. Spiller, M.D.

C. B., 50 years of age, white, was admitted to Dr. Spiller's service in the Philadelphia General Hospital October 5, 1915, and died October 19, 1915. She was therefore in the hospital only two weeks.

She said she had had a stroke of apoplexy in November, 1914. Twelve weeks before admission to the hospital she fell on the street and was confined to the house for six weeks. She fell a second time in going downstairs, and after this fall needed assistance in walking. She had been weak in her lower limbs about one year and this weakness was the cause of her falling.

She had been deserted by her husband, had given birth to five children, all of whom died shortly after birth, and she had had three miscarriages.

She was greatly emaciated and anemic. The pupils were unequal, the right being the larger. Iridic reflex to light was lost in each eye, but reaction in convergence was preserved. She could see better at some little distance. The external ocular muscles were normal. Severe pain was felt throughout the lower limbs, so severe that these limbs would be drawn up, probably voluntarily. The movements of all the limbs were preserved. The biceps and triceps tendon reflexes were normal or nearly normal, the patellar and Achilles reflexes were absent on each side and there was no Babinski. Tactile sensation was fairly well preserved, but the sense of pain was a little impaired, presumably in the lower limbs. Dr. Clarke, in making some special tests, found the sense of position impaired in the toes and the vibratory sensation impaired in the lower part of the lower limbs. She had lost control of bladder and bowels. Coördination was much impaired in all the limbs. She said she had lost about fifty pounds in weight during the previous two years.

The case was regarded as one of tabes with emaciation and anemia, and a blood examination was not obtained.

The microscopical findings in the spinal cord were those of tabes and of severe anemia. Dr. Spiller emphasized the fact that this was not a case of severe anemia in which the tabetic symptoms were caused by the anemic changes in the posterior columns of the cord, but he showed that the findings were those of two distinct processes, viz., tabes and severe anemia, probably pernicious anemia.

Dr. George E. Price said regarding Dr. Spiller's remarks in reference to the association of changes in the anterior horn cells in tabes that he was studying the cord of a tabetic, a patient from the Philadelphia General Hospital, who also had shown marked general muscular wasting. The sections show changes in the anterior horn cells and in certain areas, particularly in the lumbar region, marked degeneration of the anterior roots.

Dr. Frederick B. Clarke (by invitation) read a paper on acro and proximo ataxia in tabes dorsalis.

Dr. George E. Price asked whether Dr. Clarke found any difference in the movements performed by the right and left hand. Normally the movements of precision are better performed by the right hand in a right-handed person.

Dr. Clarke replied that there was not so much difficulty in performing

these tests as one might suppose, since the tests are very simple and consist in drawing straight lines. There is not so great a difference between the right and left hand in performing the tests as there is between the right and left hand in writing.

Dr. Owen Copp read a paper on the psychiatric needs of a large community.

Dr. J. Hendrie Lloyd said this was such a very large subject that he hardly knew how to discuss it without giving it more thought. It seemed to him that Dr. Copp's paper opened up the whole subject of psychiatric hospitals. From his knowledge of the Pennsylvania Hospital for the Insane he thought that Philadelphia has there already a very good psychiatric hospital. The Pennsylvania Hospital for the Insane has for a great many years discharged a very important function to this community and state and even to the larger community of the whole country; and since Dr. Copp took charge of it it has developed a very efficient and much needed psychiatric work. This raises the question, which has often been in Dr. Lloyd's mind, why in all this threshing around for psychiatric hospitals we should, as it were, be reaching out to get something different from what we already have. He took this opportunity to say, what he said last fall before the State Medical Society, that we have right here in our old established hospitals proper plants and proper facilities for thoroughly equipped psychiatric hospitals. Dr. Lloyd believed that we shall have in the Philadelphia Hospital, when it is once properly organized and put on its feet, the opportunities for one of the greatest psychiatric clinics in the world. How are we going to do any better by establishing small psychiatric hospitals? This city has a million and a half inhabitants. It is bound to take care of a vast number of the indigent insane. That work can be done better in a large general hospital like Blockley than in small special hospitals. In the first place, insanity is only a disease. This is a truism with the doctors, but it is not a truism with the community at large. In order to study it we must have the facilities of a large general hospital, with its laboratories and the coöperation of the other staffs; of the internists, of the gynecologists, of the pathologists, of the serologists, of the ophthalmologists; all these, if we are going to do scientific work, must coöperate. Where can they coöperate so well as in a big general hospital like Blockley, where all the laboratory facilities, all the various specialists, all the necessary number of internes and nurses are available under one management and one roof? Dr. Lloyd believed it is the shortest-sighted policy in the world to decry the Philadelphia Hospital. The whole profession should understand the necessity of rehabilitating that place and making it satisfactory. It is not necessary for us to look to Germany or any other place. We have the opportunity right here in Philadelphia, and we can do the work ourselves. Dr. Lloyd said he was only speaking on this subject with reference to the psychiatric work. Dr. Copp's paper has opened up the subject of social service and the after care of the insane. While correlative subjects, they require separate consideration. However, this social service can be performed by organizations in conjunction with a big psychiatric hospital like Blockley. Dr. Lloyd thought that we as psychiatrists should try more and more to bring about this social service work in this city. We have excellent wards at Blockley, and good work is being done there now. The buildings there are not badly arranged, but they are not fireproof, and this is one of the worst things to be said against them. With that exception Dr. Lloyd said we have at the Philadelphia Hospital the opportunity for all the municipal psychiatric work that is necessary to be done for this town, excepting, of course, the work of the Pennsylvania Hospital for the Insane, which, however, serves a different class of patients. It is not so much new psychiatric hospitals that are wanted as good psychiatric work in our present hospitals.

Dr. Charles K. Mills said he was in full accord not only with what Dr. Copp had stated, but with the remarks of Dr. Lloyd. At the Pennsylvania Hospital for the Insane good work has for some time been done, as most of those present knew, and he would like to call attention especially to the fact that the laboratory work now being done at this institution by Dr. Orton is of unusual value. He had learned this, among other ways, through students of the Philadelphia Post-Graduate School of Neurology who have taken the course in pathological histology given by Dr. Orton. A few words might be said with reference to the Philadelphia General Hospital, or "Blockley," as we prefer to call the hospital. We have the opportunities there, not fully developed, however, for a great psychiatric clinic and also for a great neurological clinic, one of the best in the world. The need of a great pathological laboratory is about to be met. Dr. Mills had been told within a few days, and he supposed it was general knowledge, that a large part of the million dollars already secured will be devoted to the building of a pathological laboratory. This seems to be absolutely assured and in that laboratory should be, and Dr. Mills trusted would be, a department especially assigned to neuropathology, both in the general neurological and in the psychiatric sense. There are other things we need at Blockley which we do not often consider. It will never be as great as a municipal hospital should be until we have connected with it some form of out-door service. Dr. Mills sees no reason why there should not be, as in one or two and perhaps many other of the great hospitals abroad, an out-door neurological service, and other out-door services as may be necessary, these to be correlated with the in-door services. This, Dr. Mills thought, would some day come about, although it may not be so soon as the laboratory. It was true, as Dr. Lloyd said, that we do not need in Philadelphia so much a new psychiatric hospital as we need to take this great institution and to develop it to that and to other ends. Dr. Mills said he was one of those who believed that the buildings were very serviceable at Blockley and other buildings could be added to the present without destroying these.

Dr. Francis X. Dercum said that he had very little sympathy with the talk regarding the unsatisfactory character of the buildings of the Philadelphia General Hospital. These buildings, he declared, compared very favorably with La Salpêtrière at Paris and the Allgemeines Krankenhaus in Vienna. The rooms are large with high ceilings and large windows and are well ventilated. To talk of tearing them down is quite absurd. The buildings could easily be modified so as to make them modern in every respect.

Dr. George E. Price said he had always thought that the large hospitals should make some provision for the acute mental cases. One of the best ways to overcome the feeling of the public toward mental diseases is to let them see that these patients are considered as being ill as is the case of typhoid, or pneumonia and are received in the general hospital and there taken care of. In our larger hospitals we have laboratory facilities and already have the various specialists and other requisites for scientific study. He very much enjoyed Dr. Copp's paper and particularly his remarks in regard to preventive factors. After all, Dr. Price thought that was the direction in which we have to look for a diminution in the number of mental patients.

Dr. Owen Copp said it seemed to him that all are in accord in the opinion that an extraordinary opportunity exists at Blockley for a psychiatric hospital in association with the Philadelphia General Hospital with an enormous amount of material of all kinds. The men and the schools connected with it would be most helpful. At this time when the hospital is about to be reorganized emphasis should be laid upon the importance of the subject and all should work together for this end. Of course it would mean that the mass

of chronic cases now at Blockley would need to be removed. The number should be cut down to about two hundred and fifty. Dr. Copp wanted to bring the matter to attention in order that all might get together and make use of the present opportunity. There is a selective work which the Pennsylvania Hospital ought to do and intends to do for a certain class of patients that cannot be treated at Blockley or in any of the public hospitals.

NEW YORK NEUROLOGICAL SOCIETY

MARCH 7, 1916

The President, Dr. WILLIAM M. LESZYNSKY, in the Chair

CASE OF SPINAL AND BULBAR GLIOSIS

By W. M. Leszynsky, M.D., and A. D. Dryfoos, M.D. (the latter by invitation)

The patient was from the service of Dr. Leszynsky at Lebanon Hospital. Boy, 16 years old, family history negative, had always been well except for usual diseases of childhood. Present illness began March, 1913, with prostration and vomiting, pains in the neck, occasional diplopia. Patient appeared to have difficulty in swallowing; when eating would cough till he vomited. There was greater difficulty in taking fluids than solids. He felt weak and had to lie down frequently. August 13 he was in the medical service of the hospital and increased knee jerks were noticed. Babinski's sign was present. After several months the patient slightly improved and vomiting ceased. In June, 1914, his gait was affected. He was unable to move about unassisted. February, 1915, he was readmitted to the hospital. Examination showed pupils equal, reacted to l. and a., horizontal nystagmus present to both sides. Facial innervation and tongue were normal. There was hypesthesia and hypalgesia in both upper extremities, extending to three inches below insertion of the deltoid. Lower extremities showed good muscular power; knee jerks increased; clonus and Babinski present; abdominal reflexes were present, feeble; cremasteric more on right. Ataxic gait persisted. Cerebrospinal fluid was negative. In April, 1915, speech was affected and he complained of vertigo. At the present the patient had a combined spinal and cerebellar syndrome. His gait was suggestive of cerebellar rather than tabetic ataxia. There was asynergia of the trunk muscles rather than gross incoordination of extremities. Pupils equal, reacted to l. and a., third and fourth and sixth nerves were not affected, fundi were normal. There was present a combined horizontal and rotary nystagmus to the right. There was no caloric reaction on stimulation of either ear. Hearing was not affected. The sensory and motor fifth were not affected. There was no paresis of the lower right facial, due perhaps to lesion of the hypoglossus nucleus which sends some fibers to the facial nerve. There was atrophy of half the tongue and deviation of tongue to right. There was paresis of the soft palate which hung down practically immobile. Pharyngeal reflex was absent. Patient had regurgitation of fluids through the nose at times. Speech was nasal, weak and hoarse. There was paralysis of the right vocal cord. The ninth and eleventh nerves were not involved. There was also present marked atrophy of both shoulder girdles and of the small muscles of the hands. Reflexes were preserved. Knee jerk and Achilles jerk increased, and clonus and Babinski present on both sides. No disturbance

in touch, pain or temperature, but there was loss of tuning-fork sensation in arms up to elbows and legs up to knees. Muscular power diminished in arms, right more than left; in the legs it was good. Postural sense was lost in hands and feet; there was stereoaesthesia, adiadochokinesis and hypotonia of hands. The patient presented the spinal picture of an amyotrophic lateral sclerosis, plus slight involvement of the posterior columns. There was also involvement of the right tenth and twelfth nuclei. The loss of caloric reaction with normal hearing pointed to involvement of the vestibular nuclei and the static and motor ataxia to an involvement of the inferior cerebellar peduncle. Diagnoses to be considered were amyotrophic lateral sclerosis (bulbar type); syringobulbia; and gliosis involving several tracts (combined tract degeneration).

Dr. Leszynsky said he had seen the boy several years ago, and the condition was then limited to the lower extremities with a certain amount of disturbance supposed to be due to some cerebellar involvement. Later the boy was seen again and the symptoms had advanced. Now there were bulbar symptoms. The announcement of the meeting stated that the case was one of spinal and bulbar gliosis. Dr. Leszynsky did not feel that this was the ordinary spinal gliosis. There was absence of marked sensory symptoms.

Dr. Abrahamson said he did not see why this case could not be considered a cervico-bulbar type of multiple sclerosis. He had a nystagmus, he had ataxia, he had tremors of both hands, especially the left. The weakness of the abdominal reflexes was also suggestive. The scattered, yet not intense involvement suggested multiple sclerosis instead of gliosis. Then there was lack of response to caloric stimulation, showing vestibular involvement. In this connection the ordinary hearing tests were not sufficient. There should be careful range estimation to prove that hearing was normal. It was unusual to get a total loss of vestibular and none of the cochlear sense.

On the whole the symptoms, the nystagmus, the disappearance of abdominal reflexes, the presence of ataxic tremor, impressed one as symptoms of multiple sclerosis. The change in the sensibility, the hypesthesia and hypalgnesia had disappeared, and now only disturbance of deep sensibility existed. No gliosis would come and go away completely, and show such remarkable exacerbations and remissions.

Dr. Leszynsky said he had not considered the case one of multiple sclerosis, but he did not feel justified in excluding other diagnoses. The nystagmus appeared very late, although the bulbar symptoms appeared early. Dr. Abrahamson might have opportunity to study the case further, as the boy would be sent to Montefiore Home.

Dr. Dryfoos said that the differentiation of multiple sclerosis from circumscribed myelitis was not always easy. Some features of multiple sclerosis existed, but others were lacking—optic atrophy and intention tremor. The permanent loss of deep sensibility and the acute onset with simultaneous involvement of the bulb and cord, also spoke against multiple sclerosis.

REPORT OF A CASE OF CHOREA, TREATED WITH VACCINES

By H. W. Frink, M.D.

The patient, a girl of 15, born in the United States, who came to the Cornell Dispensary in December, 1915, with typical chorea. Family history was negative. Two brothers were stutterers. One sister had fainting spells, non-epileptic. Patient had had measles, chickenpox, and mumps since she was eleven. Tonsilitis had occurred every month during the winter. She had had nearly thirty attacks in all. The tonsils had been imperfectly re-

moved, but without result. She had had considerable toothache for the past year and six teeth had been extracted. The chorea first involved the right side of the body, then both sides. After vaccine injections the patient soon began to improve, gained weight and lost the choreiform movements. Unfortunately in this case there were many factors which prevented one from saying definitely that recovery was due to vaccine treatment, although it was coincident with it. The removal of the teeth, and excision of the tonsils might have been factors, and the child might have gotten well in time spontaneously.

Dr. John H. Richards, of Cornell (who discussed this paper by invitation), said that on account of the relation between rheumatism, chorea and endocarditis, Dr. Hastings thought it would be well worth trying out the blood cultures in chorea cases. *Streptococcus viridans* had been found in a large percentage of cases of chronic deforming arthritis, and in endocarditis of the rheumatic type. The first case of chorea investigated showed positive blood culture for *Streptococcus viridans*. The blood was planted in specially prepared media which is necessary for the growth of the organism. A small amount was placed on one plate and gradually increased in other plates until the last plate contained 4 to 5 c.c. of blood. It was found that *viridans* would not grow well with a large amount of blood in some cases. This might be on account of the natural immunity of that blood to this organism. The patients probably had some amount of natural immunity to the organism, otherwise they would develop general sepsis. A second case observed was from the Second Division of Bellevue, and was diagnosed as chorea by Drs. Frink and Kennedy. This case showed positive blood cultures for *Streptococcus viridans*, and later developed general sepsis. (By general sepsis is meant clinical septicemia.) Two weeks later the patient died with hyperpyrexia. The blood was full of *Streptococcus viridans* at the time of death. It was a regular clinical septicemia case. In all, eleven cases of chorea had been studied in which *Streptococcus viridans* had been found, with no other growth. Dr. Thro had determined the identity of the organism and said that it differed in no respect from the *Micrococcus rheumaticus* of Poynton and Paine, nor from the organism found most often in malignant endocarditis and deforming arthritis. The culture is very definite and can be transplanted in suitable media; with care, it can be grown almost as easily as *staphylococcus*. Dr. Richards said he did not think that there was any doubt that *Streptococcus viridans* was the infecting organism in rheumatism. He thought one was justified in assuming a relationship in the case of chorea. In the study of chorea, it was worth while to make further investigation as to the nature of the cause. It could be expected that *Streptococcus viridans* would be obtained from the blood in many cases.

Dr. William C. Thro, of Cornell (who discussed the paper by invitation), said that in December, 1915, Dr. Frink sent the patient to the laboratory of clinical pathology at Cornell and he suggested that a culture be made from the tonsil and that vaccine therapy be used. Dr. Thro had found that the tonsil culture was very nearly a pure growth of typical *Streptococcus viridans*, and in the light of Dr. Richards's work on chorea he decided to use the vaccine. Dr. Thro had found that *viridans* was present in every culture that he had made from the tonsils, and this had been corroborated by the work of Cecil and Hastings, who found the organism very frequently in cultures made in cases of respiratory disease. The patient was treated along the usual lines of vaccine therapy, and was injected subcutaneously alternately in the right and left arm, twice a week. Twenty-one injections had been given up to date. Improvement was noticed after four injections. The girl had gained ten pounds and certainly looked much better. The *viridans* was first described by Schottmueller, and later Rosenow isolated it in various patho-

logical conditions. The typical green area, seen surrounding this organism, on transplant, was most likely due to lactic acid formation which caused the greenish pigment. In some cases at the end of forty-eight hours there was a small area of hemolysis, but not like the larger clear area of the *Streptococcus hemolyticus*. This organism was probably discovered in the blood of chorea patients by Dr. Richards, for one thing, because he kept the plates longer than most workers did. Dr. Libman said he kept his plates seven days in his studies on endocarditis. Dr. Richards kept his plates for ten days. The organism was similar to *Micrococcus rheumaticus* of Beattie. There had been great dispute as to the means of separating these streptococci. The use of carbohydrates was considered to be of doubtful value.

Dr. Walter Timme said that the view of *Streptococcus viridans* as the cause of rheumatism and tonsillitis might be accepted, but that it was the cause of chorea might well be doubted for the following reason: within the last sixteen months reports from Austria and Italy stated that cases of chorea of the infectious type had been submitted to lumbar puncture. The fluid had been found to be under extreme pressure. Relief of this pressure relieved the chorea in from 60 to 75 per cent. of the cases. This had been proven at the Neurological Institute, where they had made similar experiments. The first cases were reported by Dr. Timme last May, typical infectious chorea cases. One very bad case, a convulsive chorea of most pronounced type, had no treatment except rest for a few days, at the end of the fourth day lumbar puncture being done and 25 c.c. removed under pressure. At the end of twenty-four hours the patient was normal as far as the chorea was concerned. He was still suffering from the tonsillar infection. There was no return of the chorea. Another case was of a child with rheumatism and tonsillitis and chorea; the chorea partially succumbed to this treatment in twenty-four hours, although the child still had rheumatism and tonsillitis. Thirty c.c. more were withdrawn and the choreiform movements ceased absolutely.

Dr. Oberndorf asked if *Streptococcus viridans* was found in any of the spinal fluids.

Dr. I. Strauss said he would like to have that question answered before he discussed the subject.

Dr. Richards said that in two cases the spinal fluid had been cultured, but the organism had not been found. Lumbar puncture in these cases had given them no results.

Dr. Strauss said the cure of one case of chorea proved nothing as to the efficacy of vaccine. Chorea had so many different manifestations that no deductions could be made in one case. Regarding Dr. Timme's remarks, some of the work started in Vienna had induced Dr. Strauss to withdraw spinal fluids, as a therapeutic measure. He did not get uniform results. He did not think the fluid was under high pressure. In regard to cultures, they had cultured aerobically and anaerobically the blood and spinal fluid in at least seven cases of chorea in the past year at the laboratory of Mt. Sinai Hospital. He thought that the men there who worked on it ought to know *Streptococcus viridans* and how to culture it. Dr. Olitsky had done most of the work. They had not obtained the organism, why he did not know. They had inoculated monkeys intracranially with the cerebrospinal fluid of all the cases used. In one case this had resulted in typical chorea in a monkey for twenty-four hours, which then disappeared and returned for shorter periods. The monkey was killed and the brain was found normal. They examined the heart muscle for Aschoff bodies, which were looked upon as pathognomonic of rheumatism, or the disease like rheumatism in which an organism had not been obtained. None were found. There had been two cases of chorea in which the heart did show Aschoff bodies. The individual in

whom the spinal fluid caused chorea in a monkey died. This was reported by Thalhimer and Rothschild. There was found an encephalitis with hemiplegia. The cortex was removed through aspiration and there had been hemorrhage. This material was then inoculated into monkeys but nothing developed from it. In the other cases the same procedure was repeated and nothing was found. Dr. Strauss said he did not feel inclined to doubt Dr. Richards's results. There was, however, something yet to be discovered. The man who had the positive findings had the advantage of the man who had the negative ones. While Dr. Richards's work was valuable, they had not been able to confirm his findings. There was perhaps some detail of technic yet to be worked out.

Dr. Abrahamson said that he thought a word of warning ought to be given as to the dangers of indiscriminate lumbar punctures in patients with chorea; this no doubt often aggravated the choreiform movements very markedly. He had noted a case of this kind recently which had been made very much worse by lumbar puncture. The movements were more violent and the patient was extremely nervous and fearful lest the procedure be repeated. The individual must be judged very carefully. In a nervous patient there was undoubtedly harm in the procedure.

A SERIES OF CASES ILLUSTRATING THE DECOMPRESSIVE ASPECTS OF THE OPERATION OF LAMINECTOMY

By C. A. Elsberg, M.D.

Dr. Elsberg stated that he had planned to present a number of patients in order to illustrate the results that could be obtained by surgical interference in three classes of cases: (1) those in whom a tumor had been removed; (2) those in whom a very slight lesion was found, with the removal of which the patient was relieved of his symptoms; (3) a number of patients in whom nothing grossly abnormal was found and in whom nothing was done excepting the laminectomy and exposure of the spinal cord, and who nevertheless improved very markedly or were entirely cured after the surgical interference. On account of the bad weather only three patients had responded—one of which belonged to each of the three classes above enumerated. The first patient was a young woman who had been admitted to the Neurological Institute on the service of Dr. Peterson. For nine months the patient had had a tingling in the left leg, with gradually increasing weakness in that leg. She denied that she had ever had any pain in the back or limbs. Examination showed that the left leg was markedly parietic, while the right lower extremity was slightly weaker than normal. The reflexes in the lower limbs were exaggerated, and there were very slight disturbances of tactile sense, but very distinct diminution in pain and temperature senses up to the level of the eighth dorsal segment. Dr. Elsberg stated that there had been considerable difference of opinion as to the cause of the symptoms, but Dr. Foster Kennedy believed that the patient had an extramedullary growth at about the eighth dorsal segment. At the operation, a large tumor compressing the cord at the eighth dorsal level was removed. The tumor was firmly united to the inner surface of the dura by a layer of bone about 3 mm. in thickness. The patient recovered rapidly after the operation, and she was now, three months after the operation, perfectly well. Dr. Elsberg then related the histories of several other patients from whom he had removed spinal tumors and presented illustrations of the conditions found at operation. The most unusual case was that of a woman who had three tumors connected with each other by strands of fibrous tissue, each one of the

growths lying under a nerve root. On account of the tumor lying under the eighth right dorsal root and giving pain in the right hypochondrium, the gall bladder had been removed in another hospital; on account of pain in the right lower abdomen due to irritation of the ninth and tenth right dorsal roots, the appendix was removed by a second surgeon. The patient was about to be operated upon by still another surgeon for a right inguinal hernia when she was seen by Dr. Abrahamson. He recognized the fact that the patient had a spinal cord tumor, sent her into Mt. Sinai Hospital, and the growths were removed by Dr. Elsberg. In connection with these cases, Dr. Elsberg made some remarks concerning the sensitiveness of the spinal cord and membranes which he had observed during spinal operations which were done under local anesthesia. The outer surface of the dura was found to be insensitive to pain when it was gently stroked, while the inner surface of that membrane was found very sensitive (when the inner surface of the dura is stroked the patient regularly complains of pains in the back), and Dr. Elsberg believed that the pain in the back often complained of by patients with spinal tumors was due to irritation of the sensitive inner surface of the dura. The spinal cord itself seemed to be insensitive excepting near the line of entry of the posterior roots into the cord. When this part of the cord was touched, the patients often complained of a peculiar burning sensation which they referred to the periphery of the body or were unable to locate. Dr. Elsberg then presented a man upon whom he had operated some years ago on account of persistent severe pain in the back and slight Brown-Séquard symptoms. After excision of a small piece of slightly congested dura, the patient was at once and permanently relieved of his pain, and the other symptoms rapidly disappeared. Finally, Dr. Elsberg presented a patient with multiple sclerosis upon whom he had performed a laminectomy. The patient had marked bladder symptoms and an advanced spastic paraplegia. There were slight sensory symptoms up to the level of the ninth dorsal segment. At the operation nothing excepting the typical flat pale cord of multiple sclerosis was found; there was no increase of fluid, no adhesions, no gross abnormalities. Nevertheless, the patient began to improve after the operation. The spastic symptoms gradually disappeared and, excepting for persisting bladder symptoms, he was now perfectly well. The abdominal reflexes, which were absent before the operation, soon returned. The speaker said that at the Neurological Institute and at Mt. Sinai Hospital he had seen a number of patients with level symptoms in whom the diagnosis of sclerosis was probable who had been much improved after laminectomy and simple exposure of the cord. The cases he had operated upon were selected from among a large number, and in each of them there were more or less distinct level symptoms as evidence of a localized lesion. In many of the cases the diagnosis of multiple sclerosis was not certain, and the laminectomy was therefore really an exploratory one. The improvement was so definite and was observed so often, that one was forced to the conclusion that there was a connection between the operation and the change in the symptoms.

Dr. Foster Kennedy said that Dr. Elsberg did him too much honor when he mentioned that he had made here a diagnosis of "extra-medullary" tumor. He had diagnosed a tumor from the characteristic history, but he does not say now whether a tumor is extra-medullary or intra-medullary. For a long time he had found that all the signs he had relied upon could not be trusted to show whether a tumor was outside or inside the cord. He was without guide in that matter. He believed that one was only able to diagnose compression of the cord and its location, and then indulge in what the chairman had called "speculative pathology." There was a certain amount of weight in what Dr. Elsberg had said in regard to opera-

tive interference in some cases of insular sclerosis. They had had several very extraordinary cases of that kind. Operation was performed in several in whom nothing was found but a flattened cord, but the clinical condition cleared up entirely afterwards, as had occurred also in certain cases of cauda equina neuritis, in which the toxin was believed to ascend from the peripheral nerves. This rather radical view had to be governed by a wise choice of cases. In an individual where there had been insular sclerosis, who had a marked spasticity, and a gross sensory spinal level, and had previously had attacks of diplopia with cerebellar affection of the arms: such a person ought not to be operated upon; the disease had got a too scattered grip of the nervous system, but there were cases where the lesion was confined to the spinal cord, which ought to be operated upon if one could be sure that the surgeon had such skill as not to jeopardize the patient.

Dr. Abrahamson said he would add a word about the patient who had a cholelithotomy and cholecystectomy and appendectomy performed. They later also wanted to operate upon the same patient for hernia. It was evident, however, that she had a tumor of the cord. Dr. Abrahamson sent her into the hospital with that diagnosis. As to the cases of multiple sclerosis, one rarely met those with level symptoms. Was there any meningitis with collection of fluid in these cases? He could well understand that opening and releasing the fluid would be a relief. He doubted if one case in one hundred had only level symptoms. Yet if one was not sure of the diagnosis of multiple sclerosis in a level syndrome there was no harm done and possible good from an operation by an expert. He did not believe in indiscriminate operating, and he wished to accentuate Dr. Elsberg's plea, that in only selected cases was the procedure to be considered.

Dr. Foster Kennedy said he thought Dr. Abrahamson meant a localized collection of fluid in the cord. Dr. Elsberg would remember one case in which they made a diagnosis of spinal cord tumor and not of multiple sclerosis. In that case a very definitely localized collection of fluid was found; there was no syphilitic history. It was just the one case in a hundred which Dr. Abrahamson said should be operated upon.

Dr. Strauss said personally he was in favor of laminectomy if there was any question whether one was dealing with a neoplasm or not. It was better to do a laminectomy than to leave an undiscovered neoplasm. There had been two cases on Dr. Sachs's service when it was thought that the level lesion was due to tumor. One individual had the operation performed in the upper dorsal region. No neoplasm was found. Following the laminectomy there occurred a large bed sore. Then another laminectomy was done, with the idea that the first was not high enough. There was no neoplasm found, but the bed sore increased in size and the patient died. One could not say whether there was a level lesion due to multiple sclerosis or whether there was a neoplasm in the cord itself, but it showed that a laminectomy might have serious results. There was some danger in drawing conclusions in clinical cases that one could not follow out pathologically. In a case Dr. Strauss saw in Vienna there were symptoms of paraplegia, and in two months that patient was walking around well. That was the first experience he had had of the possibility of remissions in multiple sclerosis. The question was whether the improvement shown in Dr. Elsberg's cases of sclerosis was due to natural remission, or whether, as in the case of salvarsan in syphilis, one had the difficulty of saying whether results would have been obtained without treatment, or whether the remission was due to treatment.

Dr. Leszynsky said it was at times difficult to successfully localize the level of a spinal cord tumor. He remembered a case in which the diagnosis was made of tumor at the seventh thoracic segment, based upon the level of sensory symptoms. At autopsy an intramedullary tumor was found at the level of the fourth thoracic.

Dr. Elsberg said there were three ways of improving one's knowledge of this subject: (1) by animal experimentation; (2) by post-mortem examinations; (3) by clinical observations, and by work on the operating table. As the result of clinical studies and observations in the operating room, they had learned that there were cases of multiple sclerosis in which distinct sensory level symptoms could be found. A certain number of these had been operated upon. The results had often been astonishing. The astounding benefits from laminectomy and simple exposure of the cord had been obtained so often that a coincidence was impossible. One result must be explained as due to some change in the circulation of the cord from the entrance of air and light into the subdural space; and the conclusion was justified that laminectomy and simple exposure of the spinal cord might, and often did, temporarily or permanently benefit or check the symptoms of spinal disease.

APRIL 4, 1916

The President, DR. WILLIAM M. LESZYNSKY, in the Chair

REPORT OF A CASE REPRESENTING SIMPLE TIC MECHANISM

By C. P. Oberndorf, M.D.

Dr. Oberndorf stated that the French school of neurology first called attention to the fact that tic movements originally represented a purpose to the ticquer, but as the purpose no longer remained vital, the movements were apparently meaningless. Brissaud and his pupils also emphasized the fact that the emotional state of the adult ticquer is that of the child. The psycho-analytic school advanced the theory that the tic is a symptomatic representation of a conflict, an oscillation between two desires, originating in childhood, but having become more or less unconscious. More recently L. Pierce Clark had interpreted the tic to be an auto-pleasurable act of sex significance. In the cases reported by Dr. Oberndorf the tic was interpreted to be essentially a defense reaction against a primarily auto-pleasurable act and to have arisen as a result, or attempt at repression, of an ethical censorship. In this light the tic, like other neurotic symptoms, constituted a compromise to retain and at the same time to abandon, an act which originally yielded satisfaction, but which had become intolerable because it did not correspond with the individual's ideal of adolescent or adult propriety. The mechanism of all of the cases, according to Dr. Oberndorf, was rather simple and almost obvious, but it should be pointed out that the purposes of childhood were simpler and more direct than those of the adult mind, and so, too, the methods of altering or suppressing them were more transparent. As an example of the type of case analyzed the following was selected: Patient, woman, 34, under analysis for a depressive hallucinosis, was remarked repeatedly to dig her left forefinger into the hollow of her cheek. She explained that she often unconsciously did this when under stress and always before going to sleep at night. During the course of the analysis its significance became clear. As a little girl she constantly sucked her left index finger and continued up to the age of eight, when her father undertook to break her of the habit by employing the usual punishments, corporal and psychic. However, when about twelve years old, she was stricken with a severe febrile disease, which was accompanied by distressing unrest and insomnia. When the family physician complained of the inefficacy of his drugs in controlling her excitement, the father suggested that he knew what would quiet her "more quickly than any medi-

cine"—namely, permission to suck her finger. The physician did not disdain to accept the hint, which worked miraculously well. After her convalescence naturally the habit persisted and again her father undertook its correction, this time by moral reasoning. During the day she successfully combated the practice but when alone at night an intense desire possessed her to revert to the infantile means of pacification. Her compromise resulted in putting her finger to the outside of her cheek instead of inside her mouth, and pressing the finger against the cheek instead of the cheek against the finger. Thus she protected herself against violating her father's admonitions and at the same time retained the equivalent of her auto-pleasurable sensation, in slightly altered form. She unconsciously reverts to this tic-like habit at the present time, only to induce sleep or when under some particular strain.

Dr. A. Stern said that there were many interesting points that Dr. Oberndorf had brought out. Purposeless movements which meant nothing to the ordinary observer did really mean something very definite when properly analyzed and properly interpreted. Nothing that the individual did was done without any object in view. It was an attempt to accomplish something. The important point of the paper was that these movements should have a proper interpretation.

Dr. Ramsay Hunt asked how long the treatment was in these cases; were the patients cured; and had they been free of their habit since.

Dr. Oberndorf said in reply to Dr. Hunt that the first patient, a boy, was not treated at all, but the case was simply studied. The father treated him by supplying a new purpose. The underlying neurotic state would, however, persist. The boy needed more handling than the clinic could give him. The second case, the woman who put her finger to her cheek, did not come for treatment for the tic; she had hallucinosis; with treatment for the former the tic disappeared. In the third case, a claustrophobia, the tic disappeared entirely, but the patient had supplanted his original tic mechanism by the claustrophobia. Dr. Oberndorf said he had noticed, in going round the wards with neurologists, that no attempt was made to explain these tic movements. These had a meaning, however, and an interpretation should be made. The tic often disappeared spontaneously, but the underlying neurosis remained and needed treatment.

PRESENTATION OF DISEASED CONDITIONS OF THE CALVARIUM, ILLUSTRATED WITH GROSS SPECIMENS

By Bond Stow, M.D. (by invitation)

Dr. Stow showed these specimens to represent the various types of gross lesions of the calvarii. His object was to give a good general view of the subject rather than to take up time in going into the minute histology of the subject. The first specimen presented, one very common in elderly people, known as senile atrophy, showed two well-marked depressions over both parietal regions. The depressions on the outer surface of the calvarium had no corresponding depression on the inner surface. They were caused by an atrophy of the diploë and in consequence lack of support and falling in of the outer table of the parietal bones. The specimen contradicted the theory of phrenologists who claim to diagnose mental status from the contour of the skull. The second specimen presented also demonstrated atrophy, but in this case atrophy due to pressure. This was a very advanced case of pressure atrophy, due to increasing intracranial pressure from a tumor. The case was that of a young girl, about twenty years of age. The sutures, it

could be observed, were literally torn asunder, and the bones of the calvarium were markedly thinned, in some places being no thicker than paper. The next specimen showed the same condition, though not in so marked a degree. In this case the cause was hydrocephalus. Abscess of brain might also cause such atrophy. In fact, anything that might cause long-continued intracranial pressure might lead to the condition seen in the last two specimens. A very remarkable instance of pressure atrophy of osseous tissue, in consequence of an aneurysm of the thoracic aorta, where the bodies of the second and third dorsal vertebrae were eventually destroyed, thus exposing the spinal cord, which was pressed upon by the aneurysm, causing paraplegia, was one reported by Dr. Bond Stow several years ago to the Medical Section of the Academy. The next specimen presented was one of exostosis following fracture. Here the excessive callus formation had become ossified and eburnated, thus leaving this hard ivory-like nodule on the outer surface of the calvarium. In contrast to this specimen was the following, taken from a case of well-marked Jacksonian epilepsy. It would be observed that an extensive endostosis had occurred from the same cause as in the previous specimen. There was originally a fracture and excessive callus formation, and from this arose an extensive endostosis which the specimen presented. This caused pressure and epileptic symptoms. The next specimen was one of considerable rarity and interest. The outer surface of the frontal bone was smooth and in every way normal in appearance, giving no evidence of the conditions that had taken place on the inner table. This specimen came from a very marked case of paranoia, in which there was marked atrophy of the frontal lobes of the brain. As these receded there was probably set up a stimulation of the osteoblasts on the inner table of the frontal bone, and in consequence this remarkable hypertrophic growth of bone tissue, a good example of an attempt on the part of nature to carry out her rule of filling up a vacuum. The next specimen was one typifying syphilis. This lesion always began as syphilitic gummatous periostitis, the lesions following along the nutrient vessels, causing various canaliculi, by pressure atrophy. When the canaliculi crossed one another a larger obstruction of tissue took place with resulting holes, thus giving the entire calvarium the appearance, more or less, of a large sponge. Along the edges of these canaliculi could be observed many places where the syphilitic irritation had caused hyperostosis and eburnation of the osseous tissue. The specimen was one that was typical of advanced syphilis of the calvarium. The next specimen demonstrated multiple metastases of carcinoma. Carcinoma of the osseous system, as was well known, was always secondary. The most common primary sources were carcinoma of the breast, of the prostate, of the thyroid, and of the adrenals. Why these primary sources of carcinoma had a predilection for metastasizing in the osseous system, especially the bodies of the vertebrae, the long bones, and the calvarium, was not known, but the fact was proved by autopsy experience. In the specimen could be observed numerous places that showed loss of tissue without surrounding evidence of inflammatory excitation. The lesions were purely metastatic, arising first in the diploë and extending outward and inward, thus involving the two tables and their final displacement and destruction. The last specimen presented was one of the rarest ever seen by Dr. Stow, one of a solitary tubercle of the frontal bone. This, too, was no doubt of metastatic origin, the tubercle having by chance lodged in the diploë of the frontal bone and thus set up the single inflammatory condition which later involved the outer and inner tables. Here could be noticed a lack of total destruction of tissue as in the case of the former specimen, representing metastatic carcinoma. There was also evident a raised and slightly thickened edge of the round tubercle, evidence of an inflammatory reaction. Dr. Stow said he did not wish to enter in the question of the neurological

and psychological aspects of these various lesions. He simply wished to demonstrate the gross lesions, and left it to the individual members of the Society to have their own ideas as to the bearing such lesions might have from the standpoint of their own specialty.

Dr. E. D. Fisher said that the specimens presented by Dr. Stow were extremely interesting. Neurologists operating on these cases frequently saw these growths, and osteitis following injury, but they did not as a rule meet with such marked conditions. Dr. Fisher said he would like to ask whether these specimens were not rather unusual. The cases of thinned skull, in hydrocephalus, were not new to him. He had seen thickened bone frequently, however, in tumors of the brain.

Dr. Ramsay Hunt said he had been very interested in seeing these specimens of Dr. Stow's. Dr. Stow was evidently not only a pathologist, but a collector as well. It was unusual in this country, where there is so much difficulty in obtaining autopsies, to see so many specimens of calvaria. The case in which the sutures were separated was very interesting, and he would like to ask the age of the patient.

Dr. Bond Stow replied that in this case the patient was quite young.

Dr. Ramsay Hunt continued to say that another result of pressure, sometimes seen, was a thinning of the skull on the interior, and that would sometimes take the exact form of the twist of the convolutions. He had seen this in cases of hydrocephalus in young adults, also in cases of tumor associated with hydrocephalus. Some years ago an Italian observer had suggested that the presence of these convolutional pressure atrophies, as found by the X-ray, was a pathognomonic sign of hydrocephalus, as differentiated from tumor. There had, however, been two cases at the Montefiore Home in which these same X-ray findings were definite in cases of tumor with secondary hydrocephalus, so that convolutional atrophy of the skull was not a pathognomonic sign and this differentiation was impossible. These convolutional changes had been seen in the interior of the skull in cases of oxycephalus in which the skull was too small for the expanding brain and such a condition had considerable clinical importance.

Dr. Strauss said that he had been interested in the remarks made in regard to X-ray findings in diagnosing hydrocephalus and tumors. That had been borne out in his own experience. The radiographer could often tell that there was internal hydrocephalus, but could not throw any further light as regards the cause. He had seen most marked change in the calvarium in the oxycephalic skulls, more marked than in hydrocephalus. In regard to the case of tumor, Dr. Fisher had remarked here that it seemed to him that the skull was frequently thickened. Dr. Strauss thought he had made a discovery when he found an abnormally thick skull in brain tumor. In one case he had even ventured to diagnose a neoplasm in a doubtful case, by the thickening of the skull. When the operator opened the flap this turned out to be correct. This fact had been described, however, by Redlich and Oppenheim, who had noted very marked proliferation in both layers in cases of tumor. It was difficult to explain why bone reacted in this manner to intercranial pressure. So far there had been no satisfactory explanation.

Dr. Fisher said a number of years ago Dr. Frederick Pedersen and he had made examination of cases of cerebral hemorrhage occurring in children, and going to adult age; from observations they found that atrophy of the brain produced changes in the cranial measurements. He would like to ask Dr. Stow if he had found this to be so.

Dr. Stow said he had not done any work on the point mentioned by Dr. Fisher, and therefore could not answer the question, but theoretically it would appear to be true. In answer to the question as to whether these calvarii were rare or otherwise, in his experience, with the exception of the

last specimen, the solitary tubercle, he had found the specimens quite common. His experience covered thousands of autopsies, where they had been in the habit of examining the calvarii with care and minutiae and they had come to this conclusion. In his experience where there was marked intracranial pressure in young people before the bones were firmly adherent, the thinning of the skull was the rule, rather than thickening. He would be loath to diagnose tumor from the appearance of a thickened skull at the operating table. He would not allow the facts of either thickening or thinning to interfere with his opinion as to whether a neoplasm was present or not.

THE CLINICAL AND ANATOMICAL FEATURES OF ALZHEIMER'S DISEASE

By Charles I. Lambert, M.D. (by invitation)

Dr. Lambert reported five cases of Alzheimer's disease, and with the aid of about twenty lantern slides demonstrated the anatomical changes present in this condition. He said that in 1906 Alzheimer described an atypical mental disorder occurring in middle life. It was striking in the insidious development and rapidly progressive course and the profound grade of dementia reached. Throughout the latter course of the disorder, focal-like symptoms of an aphasic and asymbolic character were prominent; this was the more striking because of the absence of paralytic phenomena. At autopsy the brain showed a high-grade fairly symmetrical atrophy and microscopically a widespread peculiar degeneration of the nerve cells. This latter change showed especially well in silver preparation in altered stainability, thickening and coalescence of the neurofibrils, and finally as gnarled neurofibrillar rests, the plasmatic substance having dissolved and disappeared from the nerve cells. In addition to these nerve cell changes, numerous plaques were scattered through the cortex. In two of the cases reported the age was forty-nine. There was no significant heredity or special defect in the make-up of either of the patients. In each there developed slowly without attack of unconsciousness or convulsions a most profound dementia. The onset was first evidenced in inattention, indifference and absentmindedness, later became more manifest in declining efficiency, progressive impairment of memory, retention, grasp and poverty of thought, followed by aimless, restless and foolish behavior and increasing mental dilapidation which went on toward an apathetic dementia, incapacity to comprehend, to talk, to walk, and finally a bedfast state, in which the patient muttered, mumbled and pulled at his bedding, wet and soiled himself, gulped down what was put in his mouth, and vegetated for a time and finally died. The outstanding symptoms were those of agnosia, aphasia, and apraxia. Considerable difficulty was met in attempting to analyze these focal symptoms because of impaired recognition, word understanding and expression. The aphasic symptoms seemed to rest largely on the marked dementia and might be conceived of in the nature of a mixed sensory-motor-transcortical aphasia. The apraxia at times was of a simple motor ataxia but in another case with lobal atrophy in the left occipital region, the apraxia was more ideatory in character. Two cases were presented in which the disease process was more circumscribed, involving in one case more particularly the sensory-motor field of speech and in the other case the left parietal occipital lobe, which was strikingly atrophic and this without relation to any vascular condition, but was dependent upon the presence of a large number of senile plaques and almost a complete absence of nerve cells. The fifth case was impure because of the traumatic

lesions, but the histopathology brought the case well within the group as well as the clinical observations. The disease process is to be regarded as essentially the same as in senile dementia, but is precocious in the time of its appearance and remarkable in the rapidity of its progress and the grade of dementia developed. Lantern slides of this presentation showed the atrophy present in the brain, the distribution, appearance and content of the senile plaques and their probable histogenesis as well as the peculiar neurofibrillar changes that occur in the nerve cell in cases of this kind.

Dr. August Hoch mentioned a case in which in a pure senile condition, coming on at the senile age, focal symptoms were found of a sensory aphasic type. As a basis for these symptoms the autopsy revealed no arteriosclerotic focus, but pronounced senile atrophy in the left first and transverse temporal convolutions, and a great number of senile plaques in this region. There was, therefore, an ordinary senile case with focal symptoms, the type described by Pick, to which Dr. Lambert referred in his paper.

Dr. Morris J. Karpas said that his experience with Alzheimer's disease was only from the clinical standpoint, but he found that in making such a diagnosis it was always necessary to bear in mind general paralysis of Lissauer's type, cerebral syphilis, arteriosclerosis and brain tumor. When the aforesaid conditions could be excluded the diagnosis of Alzheimer's disease became fairly clear.

Dr. Ramsay Hunt said that he would like to understand clearly whether Dr. Lambert made any distinction between the so-called Alzheimer's disease and senile dementia. His understanding was that the two affections were the same in Alzheimer's records, differing only in degree and in point of age.

Dr. C. I. Lambert said that this was merely an early and much more rapid form anatomically as well as clinically. The underlying mechanism of the disease process was the same.

THE PROBLEM OF SYPHILITIC PSYCHOSES

By August Hoch, M.D.

Dr. Hoch stated that when one thought of mental disorders associated with syphilis, one usually had in mind what was called organic mental reactions, *i. e.*, states with memory defect, retention defect, with clouding of consciousness, and the like, but that mental reactions which merely consisted in changes of mood or mental attitude, with delusions or hallucinations, were less taken into account. But, he pointed out that in general paralysis, were often found marked psychotic reactions of this type, although as a rule associated with a typical paralytic dementia; that there were, however, cases in which excellent remissions occurred without evidence of dementia. He told also of a patient who had a typical paralytic psychosis without developing, at any rate for twenty years, anything like general paralysis but only a tabes. As illustrating another possibility, he spoke of a patient who, as a result of a syphilitic vascular disorder, had a residual of a motor aphasia and right hemiplegia, but who, six or seven years ago, also had a transient psychosis like general paralysis, and later a few repetitions of similar states without developing general paralysis. He then called attention (1) to Plaut's monograph in which were described some acute hallucinatory states without any intellectual defect or clouding in cases with brain syphilis; and (2) to the cases of tabes, especially atypical tabes, with cerebral involvement, in which acute or chronic psychoses might occur. Dr. Hoch thought that this prepared the way to the question whether or not chronic psychoses (non-organic reactions) might be found as a result of cerebral involvement of

syphilis, and said that one would then expect to find, *e. g.*, chronic hallucinatory or chronic paranoid conditions, and dementia præcox-like pictures. Plaut had reported some such cases, and Dr. Hoch briefly sketched two, from among a larger number of such cases which had come to his observation. He pointed out that he was as yet unable definitely to differentiate these from similar reactions which seem to occur on a purely constitutional basis, in spite of Plaut's attempts to do so. The question whether these chronic psychoses were dependent on the syphilis or were accidental was therefore still a problem to be investigated further, although the observations were increasing in number, and in one of the cases reported, as in some others, the onset of the præcox-like picture was so closely associated with the onset of cerebral syphilis (it had existed for ten years without any development of organic dementia, as one would find in general paralysis, or certain other conditions of cerebral syphilis) that it was difficult to deny an actual internal relationship. Dr. Hoch finally pointed out that, although one had a certain possibility of forming an opinion as to the mechanism by which the cerebral syphilis produced the actual intellectual defects (memory defects, clouding, etc.), one had as yet practically no way of telling by what mechanism the acute or chronic psychoses under discussion were brought about by the involvement of the brain.

Dr. Ramsay Hunt said he was glad to hear Dr. Hoch's presentation of this subject. The comparative infrequency of the pure psychoses in syphilis had always surprised him. The disease was one, which, in a predisposed person, would tend to induce a psychosis, for instance, there were the factors of anemia, intoxication and the intensive treatment by strong remedies, and the anxiety attending the disease. The psychic reactions, in his experience, were chiefly seen in the involutional period of life. He would like to know if Dr. Hoch laid stress on the milder cortical changes found in tabetics. Slight cortical lesions apparently not progressive were occasionally reported in this disease. In these cases a high percentage showed milder cortical changes and diminution of the number of fibers in the cortex.

Dr. L. Pierce Clark said he had recently seen a man of forty-nine years of age, who had tabs of long standing, and who for the past year, while not under specific treatment, had progressive optic atrophy, some right facial paralysis, and frequent fugitive attacks of sixth nerve weakness of both sides. Some six months ago he began to show mental symptoms of anxiety which steadily increased to that of the usual picture of involutional melancholia with intense insomnia, refusal of food, and attempts at suicide. There was much dilapidation of behavior and conduct which occasionally, at irregular intervals after intraspinal injection, entirely remitted for twenty-four or thirty-six hours with completely clear sensorium and full insight. The most accurate tests had failed to reveal any organic mental reaction. The state of pathologic depression with occasional hallucinatory symptoms proved enduring.

Dr. E. D. Fisher said that he was very much interested with regard to types of psychosis. He thought it was frequently found that there were organic conditions, but that did not do away with the fact that in some types that were not general paresis, there was a psychosis. When there were lesions, such as blindness, which might be complete, the condition accompanying this might be allied to depression and suicidal tendency. It might be accounted for as having arisen from the symptoms and might be entirely independent of the syphilitic condition. The paper was interesting as questioning whether one was dealing with psychosis as a constitutional or as a syphilitic condition. It was often constitutional, rather than syphilitic.

Dr. Steinach said that he was glad Dr. Hoch took the attitude that because psychosis occurred in a syphilitic individual it was not necessarily due

to syphilis. Neurologists were all too prone to make the diagnosis of general paresis when a psychosis arose in a person who had previously contracted syphilis. Dr. Steinach said he had frequently seen attacks of manic-depressive psychosis occurring in a luetic individual erroneously called general paresis. He recalled one case, where the diagnosis of general paresis with bad prognosis had been made, way back in 1888, by so excellent a diagnostician as Seguin, and yet the patient had had recurrent attacks and had repeatedly been committed to a sanitarium, as recently as five years ago by the speaker. The reason was not far to seek. Psychiatrists analyzed the emanations of a patient's mind and then endeavored to make a diagnosis of the disease. In paresis they frequently saw symptoms that markedly resembled manic-depressive psychosis or even dementia præcox, and on the other hand, a paroxysm of manic-depressive might occur in a syphilitic, which was in no way related to general paresis. These errors had resulted from the attitude of basing too much on an analysis of merely the mental symptoms. It was, as it were, as if one were to sit at the bedside of a delirious patient and jotting down the content of the delirium, endeavor from the delirium alone to make a differential diagnosis as to whether the patient was suffering from typhoid fever or from pneumonia. Until there was a surer basis than the psychotic symptoms alone, there was very apt to be a very large proportion of error in the diagnosis of mental disease.

Dr. H. Climenko said that this was a very valuable paper. Even persons constitutionally predisposed by syphilis need not have general paresis. Also general paresis might not be a syphilitic lesion.

Dr. Wm. M. Leszynsky said there seemed to be a strong tendency on the part of the general practitioner, and also on the part of some neurologists, since tabes and general paresis had been found to be due to syphilis, to ascribe all mental symptoms to general paresis. He thought that this paper had a timely lesson, indicating that symptoms in persons who had had syphilis were not necessarily general paresis.

Dr. August Hoch, in closing the discussion, said in answer to Dr. Ramsay Hunt, that there were milder cortical changes, as well as meningitic changes, in many cases of involvement of the nervous system by syphilis, but that we had at present no means whatever to correlate these with any of the psychoses in which there was no deterioration of the organic type.

Translations

VEGETATIVE NEUROLOGY, THE ANATOMY, PHYSIOLOGY, PHARMODYNAMICS AND PATHOLOGY OF THE SYMPATHETIC AND AUTONOMIC SYSTEM

BY HEINRICH HIGIER

WARSAW

[Authorized Translation by Walter Max Kraus, A.M., M.D., New York.]

(Continued from page 88)

It has been shown that not only stimulation of the parietal peritoneum is a stimulus adequate to produce pain, a fact shown by Lennander, but that stretching of the visceral peritoneum and colicky contractions of the circular intestinal muscle may do the same even in a normal intestine. According to Lennander, pain stimuli cannot reach the brain *via* the splanchnic nerves. This does not exclude the possibility, say Froehlich and Meyer, that the centripetal neurone may pass in the splanchnic nerves to the spinal cord and by means of short motor reflex paths produce effects in either the splanchnic domain itself or in the abdominal muscle innervated by the spinal nerves, effects which are never brought to consciousness. The bulbar autonomic vagus nerve remains as the bearer of sensory stimuli from the intestines as the sacral autonomic pelvic nerve is the bearer of sensory stimuli from the bladder, in fact, from the entire vesico-recto-genital region.

Eppinger and Hess in their study of tabetic crises (gastric, laryngeal, bronchial, vesical, rectal and genital) came to the conclusion that these were almost exclusively due to stimuli in the autonomic system. Severe degenerations are found only in the main branches, the vagus nerve and the pelvic nerve or their branches. The sympathetic system, as for example the ganglionic chain, are free of any such disease. These authors believe, basing their belief upon anatomic-pathological grounds, that it is probable that the

tabetic poison which is selective in the involvement of peripheral sensory neurones, also has special affinity for visceral autonomic nerves since they are almost exclusively involved, while the sympathetic is scarcely at all involved.

Forster, for the following reasons, claims sensory fibers in the vagus as well as in the splanchnics. (1) Because hyperesthetic zones (Head zones) are found not only in the thorax and abdomen but also in the anterior and posterior part of the head area in disease of the gastro-intestinal tract. This he believes due to radiation from the medulla (*via* the vagus) into the trigeminal area. (2) Because in patients with complete transverse section of the cord at the cervical level, there is a feeling of pressure and nausea in the stomach upon strong pressure of the fist into the abdomen, in spite of the anesthesia of the skin in this area.

In all probability the vagus carries the specific stomach and intestinal sensations as nausea, while the sympathetic carries ordinary pain sensations. In tabes then we would expect splanchnic crises more often than vagal crises. The first would show itself by severe pain, hyperesthetic skin zones, increased abdominal and epigastric reflexes, the later by nausea, vomiting and hypersecretion.

Forster argues as follows: If splanchnic crises in tabes are due to stimulation of sensory fibers, the pathological process must lie in the intraradicular part of these fibers through the posterior roots. Operative interference, section of the roots, should have a distinctly beneficial effect. Forster's operation in gastric crises is to cut the sixth, seventh, eighth, and ninth dorsal roots; in intestinal crises, the lower dorsal roots. It is not so simple a matter with vagal crises. Here the sensory fiber change lies somewhere between the sensory ganglion of the vagus (ganglion jugulare) and the entrance of the vagus root into the medulla. A therapeutic effect theoretically could only be obtained by cutting at this place, and, not subdiaphragmatically as recommended by Exner, who bases his contention on the supposition that the crises are not due to sensory hyperirritability but to stimulation of the motor endings in the vagus.

It would be of great value to know the result of every operation of the above nature so as to discover just which of the two nerve tracts (vagus or splanchnic) carries the pain sensations. Heile recommends intradural injections of anesthetic liquids into the foramina vertebralia in order to destroy the function of the posterior roots which seemed to be involved.

If this injection succeeds in allaying the pain of gastric crises, it shows that the pain sensations pass to the spinal cord *via* the rami

communicantes. If, however, only anesthesia of the skin occurs, the pain must have been carried centralward *via* the vagus.

What has been said of gastro-intestinal tabetic crises applies equally to other crises if they are of the mixed type and involve both vegetative organs and the motor-sensory segment associated with them. Examples are head, ocular, nasal, pharyngeal, mammary, sebaceous, sweat, vascular, uterine, clitoridal, intestinal, renal and bladder crises.

24. The physiological relations between sympathetic reflexes and sensations of pain and emotions deserves a closer examination.

In man the viscera not only have a sensory reflex, but also a motor and a visceral reflex (Mackenzie).

I. The *sensory reflex* which serves for protection is composed of a sensory stimulus in the zone of the organ concerned. This is either internal or splanchnic and is pain, though all authors are not agreed upon this, or external or somatic, where pain is readily felt in the hyperesthetic zones. The following are the characteristics of these sensations of pain.

(a) Splanchnic pain usually is in the midline, even if the organ by which it is caused lies on one side or partly so (esophagus, stomach, liver, intestines, kidneys).

(b) Contrary to the pain of hyperesthetic zones, splanchnic pain is not relieved by moderate chloroform narcosis.

(c) The radiating external pains are never precisely defined.

(d) The radiating external pains are felt in deeper structures (muscles, breast) not in the superficial layers of the skin.

(e) Artificial stimuli as alcohol, mustard plasters, hot applications, cantharides and the galvanic or faradic currents prevent viscerofugal stimuli from passing through the spinal roots to the hyperalgesic zones. They act as quieting, pain-relieving agents (*derivantia et revulsiva*).

(f) Both types of pain, visceral and radiating, are increased by intense emotions, as fear and anger.

II. The *motor reflex* usually consists in some stimulation in that part of the external musculature corresponding to the organ of stimulation. Examples are contraction of the chest muscles, particularly the large spinal muscles "*signe des spinaux*," which occurs in pleuritis, and contraction of the abdominal muscles in diseases of the stomach, intestines and liver. Sherrington was one of the first to demonstrate the rôle of the efferent sympathetic nerves in these reflexes. He cut the abdominal visceral nerves and stimulated their central ends. There resulted a distinct contraction of the ab-

dominal musculature corresponding to the nerve which was stimulated. This visceromotor reflex stimulation gradually disappeared on cutting the posterior roots which carried the stimuli from the visceral nerves.

III. The *organ reflex* is usually a secretory, peristaltic or antiperistaltic stimulation in the organ which is stimulated. Examples are salivation, gastrosuccorhea, vomiting, accumulation of mucus in the bronchial tree and hiccough. In all these reflexes the primary sensory irritation plays the main rôle (Head, Mackenzie, Forster).

Tabetics often do *not* have these reflexes due to visceral anesthesia. Such failures to respond normally occur in instances like the following: cremaster reflex after stimulation of the testicle, pain and abdominal contractions during parturition, abdominal pain, vomiting and muscle spasm in appendicitis.

The following chart by Mackenzie serves as an aid in the differential diagnosis of visceral disease by means of somatic pain.

Toothache often gives a viscerosensory hyperesthesia of the cheek.

The pain in the shoulder of the same side as a pneumonia is due to the fact that the sensory innervation of the shoulder comes from the same spinal segments (C 4 C 5) as the phrenic nerve supplying the pleura.

The severe pain of pleuritis caused by deep breathing is not due to pain in the pleura, but to a visceromotor reflex involving the intercostal and spinal muscles.

In heart disease pain lies in the arm and thoracic region whose sensory supply comes from the same spinal segments (D 3 D 4) as the sympathetic nerves to the heart. The rare occurrence of pain in the skin of the neck and the left neck muscles is due to the afferent vagus fibers which carry the stimuli over into the second and third cervical segments. A more significant visceromotor heart reflex is the feeling of oppression which results from a radiating spasm of the intercostal muscles. A cardiac organ reflex of less significance is the salivation and profuse urination which occur in angina pectoris, both symptoms due to reflex stimulation of the centers lying near the vagus center in the floor of the fourth ventricle.

The feeling of cold in the stomach after drinking cold water is due to a contraction of the skin blood vessels and is accompanied by a circumscribed area of goose-flesh. Thus there are two visceral reflexes, one pilomotor, the other vasomotor. The visceromotor reflex contraction of the upper left rectus abdominis in gastric ulcer

is explained by the origin of the sympathetic gastric fibers, D 6, D 7. The heartburn which results from regurgitation into the esophagus localizes itself one segment higher. Pain of gastric origin rarely is localized according to the position of the ulcer or carcinoma. It is usually in the median line, and in cardiac, fundal and pyloric disease is found in the upper, middle and lower part of the epigastrium.

A very interesting organ reflex in appendicitis is difficulty of urination which is not infrequently associated with the hyperesthesia over McBurney's point.

Pain in the upper arm in liver disease is explained by the origin in the same spinal cord segment, C 4, of the nerves to the arm and the phrenic nerve to the liver.

In disease of the kidney pelvis and ureters the visceromotor reflex passes to the testicles, the visceromotor to the cremaster and transverse muscles since the nerve supply is derived from the eleventh and twelfth dorsal and first and second lumbar segments. For this reason the testicles and the scrotum are sensitive in cases of nephrolithiasis.

Since the upper portion of the bladder is developed from the allantois (L 2) and the lower from the cloaca (S 2), the reflex pain depends upon the site of the disease. Sometimes it is above the pubic bone, sometimes in the penis and perineum. The visceromotor reflex causes spasm of the sphincter ani.

Reflex pain from the uterus and ovaries lies in the lower abdomen.

Pain in the knee in hip-joint disease is due to the identity of the spinal segment supplying fibers to these two joints, L 4. The synovia are supposed to be supplied by the vegetative nervous system just as the peritoneum.

25. A subject which stands closely related to that which has just been discussed, the sensibility of organs, is the effect of intense pain, particularly visceral pain, upon the activities of vegetative nerves. This does not relate at all to the effect upon the other part of the nervous system, the somatic or "animal." It has been shown that a temporary alteration of vegetative nervous system activity always follows severe pain. This alteration occurs not only in the organs innervated by the head ganglia, but also in those innervated by the thoracic and abdominal ganglia. Pain causes tears, buccal secretion, salivation, dilatation of the pupil, reddening of the face, palpitation, anacidity (Pawlow), uterine and gastro-intestinal inactivity (Holz).¹

¹ Tr. note. For a recent excellent treatise on this subject see W. G. Cannon. "Bodily Changes in Pain, Hunger, Fear and Rage." Appleton & Co., 1915.

This inhibition of visceral activity occurs: (1) *Via* the sympathetic nervous system, not the autonomic. Cutting the splanchnic nerve prevents its occurrence. (2) Irrespective of the source of the pain sensations, skin, mucous membranes, nerves or body cavities. (3) Irrespective of whether the pain may have reached consciousness or not. This last fact has been determined by the fact that organ reactions to pain occur even if the upper spinal cord be severed or the cerebral cortices be extirpated. The inhibitory reflexes must take place in the spinal cord. L. Müller concludes very justly that "since all the sensory nerves cannot be connected by intraspinal fibers to all the vegetative tracts, it must follow that marked sensory stimuli cause a general alteration of the bio-electrical state of the spinal cord, which in turn by means of the rami communicantes causes inhibition *via* the visceral nerves.

The subject of biotonus and the power of the cerebrospinal nervous system to diffuse nerve impulses will receive more attention later in speaking of the localization of cortical vegetative centers and the influences of emotions upon vegetative nerves. Biotonus should not be confused with "vagotonus" and "sympathicotonus" which will be discussed later as well.

26. Several very important questions in the physiology of the vegetative nervous system will receive consideration in this last section. They are (I) the location of the sympathetic centers *i. e.*, the psycho-vegetative centers in the cortex analogous to psychomotor centers, (II) the influence of the mind upon the tone of the vegetative nervous system, (III) the influence of emotion upon vegetative nerve activities.

I. Have internal and external visceral organs cortical centers like voluntary muscles and the sensory functions of the skin? In order to answer this question the relations of the vagus will be considered, since its anatomical relations, its viscero-bulbo-thalamo-cortical parts, have been very carefully studied. The vagus is a mixed nerve having three nuclei whose embryological development is different. The motor nucleus ambiguus corresponds to the anterior horn, the sensory nucleus solitarius to the posterior horn and the visceral nucleus dorsalis vagi to the vegetative nerve cell group which lies in the lateral gray matter of the spinal cord. There is no need of entering a discussion as to the reason of the inclusion of sensory fibers in the vagus trunk, nor as to their philogenetic relations. What is important is that the sensory fibers supply the mucous membranes of several cervical and thoracic organs—and that they continue upward through the thalamus to the cerebral

cortex. We also know that there is a cortical center for the fibers to the voluntary muscles of the pharynx and larynx, the pharyngolaryngeal center. This we know exists whether it came at a period when these muscles became striated or whether it existed when they were still involuntary, unstriated muscles. The philogenetic relations do not alter the facts. A cortical representation of the visceral part of the vagus, of the cardiac, bronchial, pulmonary and gastric fibers of the vagus is questionable. The same question of course arises in connection with the other autonomic and sympathetic fibers which have to do with the excretory and secretory organs of the skin and body cavities. There are now two quite opposite views upon this subject. One school is headed by Bechterew, the other by Pawlow and L. Müller.

Bechterew's school tried to arrive at a conclusion by investigating association reflexes. Association reflexes according to this school consist in a reaction which is not determined by either the strength or the quality of the external stimulus, but by the relation of this stimulus to other reflexes in the past, *i. e.*, a relation that has been often repeated and whose repetition occurs in the same manner as the reactions produced by habit. The hissing of a snake produces in us an associative reflex which manifests itself in an intense motor reaction not because of the loudness or softness of the noise, not on account of the hissing itself, but because the hissing is associated with the possibility of a bite. The presence of a cat causes a dog to run because of past experiences with the cat's claws. The smell and sight of appetizing food stimulates the appetite and starts gastric secretion.

Since vegetative functions are concerned with the most vital of body processes, processes which are activated by simple reflexes, extirpation of the cortex does not interfere with their activity, does not cause any paralysis as extirpation of the motor cortex supplying the extremities. But there does result a great defect of nerve activity in so far as associative reflexes go.

If we remove in the dog what Bechterew regards as the cortex representing respiratory activities and remove both centers, respiration proceeds normally due to the presence of the spinal, the coordinating medullary and the subcortical midbrain centers. The respiratory reflex to artificial as well as normal sensory stimuli is the same as before. But the *psychoreflex*, the associative reflex, is absent. The presence of a cat does not cause the intense motor effect upon respiration which occurred in the normal dog under like circumstances.

If both sexual centers in the upper third of the gyrus post-cruciatu8 be removed in a dog, the normal reaction of the penis to mechanical stimulation remains, but the normal psychoreflex due to the presence of a bitch in heat is absent.

If the pupillary center in the frontal lobes be removed, certain stimuli which normally frighten the animal, as threatening with a stick or whip, do not cause dilatation of the pupil, a reaction which occurs even if the third nerve be cut.

(To be continued)

Periscope

Allgemeine Zeitschrift f. Psychiatrie

(Vol. LXXII, 1915, Nos. 2 and 3.)

1. Insanity and War. H. RESCH.
2. Traumatic Neurosis. H. LAEHR.

1. *Insanity and War.*—As German literature, both medical and general, has since the beginning of the war been full of articles on insanity in its relations to this great struggle, the author asks the question, "Has a war really an influence on the incidence of insanity?" and answers it in the affirmative. The same thing occurs in connection with great political movements or great catastrophes. There were admitted to the Bayreuth Asylum from August 1 to December 31, 1913, 34 men and 38 women, while for the same period in 1914 there were 69 men and 29 women. The histories of previous wars show that an increase in the number of cases of insanity in the army is to be expected during a war. As causes there operate, during mobilization, the excitement and uncertainty, the distress of leaving behind relatives, perhaps ill provided for, with the probability of never seeing them again, while during the campaign there are the long marches and overexertion of other sorts, the tension of the attack and that of holding trenches under the fire of the enemy. Upon the officer the strain falls most heavily, for it is no light thing to have the responsibility for the lives of a number of men and to be forced to make an instant decision as to their movements. To add to this all, are exposure to the weather and often insufficient or improper food. In this war the abuse of alcohol and epidemic diseases have fortunately been reduced to a minimum. Lastly the influence of psychic infection as in panics, etc., is not to be forgotten. That there is any special form of war psychosis has been denied and with this view the author's experience leads him to concur. The functional neuroses and exhaustion psychoses seem to play an unusually prominent rôle, but dementia præcox, paresis, epilepsy and alcoholism are common enough.

In the asylum the author found seven patients who had been in the war of 1870-71 and one from the China expedition. The last was a deeply demented case of dementia præcox who had shown mental change before he started for Asia. Of the seven other patients four were examples of dementia præcox, and had developed the disease after the war, one as late as 1886. One psychopathic exhibitionist had been known to have acted insanely while before Paris. There was one epileptic and one senile dement.

The patients seen in the military hospital can be divided into two classes. The first class is composed of those who developed mental symptoms during the mobilization, while in training, or in garrison. Of these there were one manic-depressive, three precocious dementers, four epileptics, six imbeciles or psychopaths, two alcoholics and one traumatic hysteria.

In the second group are placed those who took part in the campaign, comprising two manic-depressives, two dementia præcox cases, eight epileptics, ten traumatic neuroses, one imbecile and one psychosis after a gunshot wound of the petrous bone. In twelve of these patients there was hereditary

predisposition to insanity. One epileptic had been thrown into the air by a grenade explosion. The traumatic neuroses were attributed to fright from grenade explosions to which they had been constantly exposed, and sun-stroke, the precocious demented had both been defective from the start. Only one of the epileptics had his first fit in the field. Only one patient brought the French into his delusional system as persecutors. The author thinks that while every possible man is needed by his country, care should be taken to exclude from the army all defectives. At each base hospital there should be some provision for mental cases until they can be transported to an asylum. The prognosis depends much upon timely care. After the war will come the question of provision for these unfortunates but the author does not think there is any need for pessimism as to the probable number of the insane on account of the war. So far no great increase in accommodations for them has been necessary.

2. *Traumatic Neurosis*.—In a recent article on the legal adjustment of damages in cases of traumatic neurosis, Horn has suggested as a cure for the often lengthy court processes, so unfavorable for the outcome of such cases, that the adjudication of the damages be left to a commission of three physicians, one selected by the claimant, one by the party responsible and the third by these two, their finding being binding upon both parties. He speaks of the frequency of simulation in such cases but Laehr thinks it less a matter of intentional exaggeration than that the mental condition of the victim of the traumatic neurosis becomes such that he is unable to see things in their proper proportion and gradually develops ideas of a persecutory nature, that he is damaged beyond repair, is being defrauded of his rights, etc. He illustrates his views by narrating at length the history of the case of a hysterical woman who entering a station water closet and sitting down upon the seat, through the giving way of a loose board was thrown forward on to a dirty floor, lost consciousness from the shock and sense of disgust and developed a long train of hysterical symptoms and complaints which at the time the article was written had extended over a period of six and a half years, showed no tendency to improvement, had cost thousands of marks to the insurer and promises to drag on indefinitely since the injured person could never be persuaded to accept any lump sum to close the case, as high as 11,000 marks having been offered at one time. The author regards it as useless to continue such treatment as baths, massage, tonics and even psychotherapy as long as the patient can continue to demand indefinitely monthly sums and cannot be gotten to settle. His remarks are very pertinent to the conditions which confront us in this country since the adoption of workman's compensation laws in many states. These, however, can hardly be considered to have yet taken their permanent form but must in time be modified in accordance with experience gained.

(Vol. LXXII, 1916, No. 3)

1. *Tabes and Paresis in Legal Medicine*. KREUSER.
2. *Infantilism*. O. JULIUSBERGER.

1. *Medico-Legal Questions from the Borderline of Tabes and Paresis*.—It is true that mental symptoms arising in a patient who presents the neurological signs of tabes, in the majority of cases, indicate that the case is really one of general paresis of the tabetic variety, but this is not necessarily so and each case should be studied upon its merits. From a legal point of view, no one would claim that a person afflicted with tabes only could properly be deprived of his liberty or of any of his legal rights and in many instances he need not even be separated from his employment, but can carry on his

work until far advanced in the disease. Not so in general paresis, in which the victim, in the vast majority of cases, must sooner or later come under legal control. It may be exceedingly difficult to draw the line between the two diseases and in all cases of *tabes* there must remain the fear that mental symptoms may later develop. Since these may begin in a very gradual manner, the decision as to whether or not an individual was mentally unsound at the time of entering into some contract, which it is desired to repudiate, or when he committed some unlawful act is often one involving great difficulty and responsibility. Again the question as to who is responsible for the maintenance of a patient who has changed his domicile may depend upon a decision as to when he really became insane. Since the tabetic symptoms may persist for years even before the mental unsoundness makes itself apparent, it is evident that here we have a region of doubt and uncertainty, in which there is the possibility of almost endless litigation. As a contribution to the subject, the author discusses the principles involved and mentions several illustrative cases.

2. *Infantilism*.—As a contribution to this subject the author relates the histories of two individuals as to whose mental status he was called to render an opinion.

1. Man, 43 years old, the son of an alcoholic, had at the age of nine years a fall on his head and later had had the last phalanx of his left index finger crushed. From an early age he had taken pleasure in acts of mischief, often accompanied by cruelty to animals and destruction of property. He got along fairly well at school and served his time as a soldier, though during the latter period he had on several occasions sudden impulses to breaches of discipline on account of which he later suffered remorse. Married at 25, for the first year he maintained normal sexual relations but suffered from increasing nervousness, with finally irresistible impulse to masturbate, carrying this out before women and girls, on which account he was arrested and punished a number of times. Also his childish propensity for mischief still pursued him, he took to breaking windows with a slingshot, calling out to people on the street and other senseless things. He always suffered from nervousness, had fits of depression and took pleasure in walking alone in the country collecting insects, while watching the copulation of beetles which excited him sexually. He seems to have had homosexual inclinations also, since in the absence of his wife he would denude himself, admire his rather feminine figure before a glass and imagine himself as a female overpowered and taking a woman's part in a sexual congress.

The author's view of this case is that in this man there is a splitting of the sexual nature, that normal to childhood and that to adult age being in constant conflict. The patient is autoerotic and as is usual in autoerotic subjects presents the traits of the childish and undeveloped. His weakness of will is not due to masturbation, but both of these are symptoms only. He shows an inclination to transvestitism, while sexually he has masochistic leanings, as evinced by his pleasure in witnessing the overpowering of the female beetle by the male and his fancying himself as a woman overcome by a man. He also had a disgust for hair on his body and kept his pubic region shaved clean. In all his traits he shows the childish and undeveloped. On account of the nature of the individual and his subjection to imperative ideas coming in attacks the author holds him as mentally irresponsible.

2. Man, 35 years old, who had been arrested for the theft of some small pictures which he had seized and secreted in a gallery, apparently owing to the sudden access of an obsessive idea accompanied when it was carried out with a certain sexual satisfaction. This man also presented signs of an unripe and childish nature, though in a less marked degree than Case 1, and his weakness of will seems to have been exaggerated by a rather severe pul-

monary tuberculosis through which he had been passing. The author holds him also as irresponsible. These cases are narrated too much at length to be fully discussed in an abstract, so should be consulted in the original by those specially interested.

C. L. ALLEN.

Monatsschrift für Psychiatrie und Neurologie

(Vol. 35, No. 3)

1. The Psychology of Delusions of Explanation and its Relation to Disturbances of Orientation. A. PICK.
2. Motor Aphasia with Agrammatism and Sensory-Agrammatic Disorders. E. SALOMON.
3. The Personal Experiences of a Case of Catatonia. A. KRONFELD.

1. *Delusion and Orientation*.—Two cases of Korsakoff psychosis are described, in which the orientation cleared up except in one particular. One constantly insisted that he was in a military hospital and that the doctors were military surgeons. The other persisted in believing the date to be four years later than it was. The acute delirious period in these cases acted as a foreign body in their memory fields after they had cleared up and the gap was supplied by the delusions mentioned. The false beliefs persisted in spite of perfect clearness of orientation in all other respects.

2. *Motor Aphasia*.—The case described was that of a man of 39 years, who after a right hemiplegia was totally unable to speak. He made his wants known to the family by gestures and writing. After a time he acquired a few words which, however, were used without sense. He could repeat words, but usually with difficulty and mistakes. He could read but could not read aloud. He quickly learned to write with the left hand. Spoken words were understood and he carried out complicated commands. Apractic symptoms were not present. In such words as he uttered and in his writing, paraphasia and paraphagia were marked. A lengthy discussion is given of the aphasic condition, as to whether or not it is due to inability to call up the sound picture of the word in the mind. The author for many reasons given, believes that the fundamental difficulty is an inability to recall the motor construction by the speech organs. The patient in question always indicated his mouth and chest as the real point of difficulty. Agrammatism was persistent in the author's case and is discussed at much length. The symptom has been observed in some cases during the course of recovery from motor aphasia. In this case, however, although the author had spent much effort in the direction of reeducation, there had been little improvement. The author does not believe that there is a definite cerebral localization for grammar and syntax, but rather that a lesion in a certain part of the Broca area interferes with certain associations which are necessary for grammatical construction.

3. *Catatonic Excitement*.—An account of his experiences during a catatonic excitement is given by a patient after emerging from the condition. It is graphic, full of self-analysis and interesting. A long psychological discussion by the author of the article follows.

(Vol. 35, No. 4)

1. A Case of Dercum's Disease and Discussion of its Relationship to the Ductless Glands. H. FISCHER.
2. Conduction Aphasia. G. STERTZ.

3. The Question of the Occupational Nervousness of the School-teacher. M. ROHDE.
4. The Abderhalden Ferment Reaction and its Significance for Psychiatry. S. LOEB.
5. A Few Remarks Concerning General Neuroses. H. SIEBERT.

1. *Dercum's Disease*.—A case of this condition, adiposis dolorosa, is described in a woman aged 53. The disease is five times as frequent in women as in men and almost always occurs during the involution. The rôle of other etiological factors is uncertain. The pathogenesis concerns chiefly the ductless glands. These glands are known to undergo alteration in size and function at the climacteric, so that Dercum's disease may be regarded as a perversion or exaggeration of this physiological change.

2. *Aphasia*.—The case described was that of a man of 53 who after an attack of right hemiplegia was at first completely unable to talk, but later could utter words intelligibly. Briefly, the symptoms, which are given in detail in the excellent presentation, were as follows: The ability to understand spoken words and the ability to speak words were preserved or only slightly disturbed. There was, however, great difficulty with spontaneous speech and repetition. Reading and writing also showed profound disturbance of internal language. In other words, the symptoms were those of Wernicke's conduction aphasia. At the conclusion of a long discussion of various forms of aphasia the author declares his case to be one of partial motor aphasia—that conduction aphasia is due to a lesion of the association paths, showing in one case more the motor manifestations, in another the sensory. The speech-association field is usually believed to be the Island of Reil, but probably is more extensive.

3. *Nervousness of School-teachers*.—There is no form of nervousness peculiar to this occupation. The patients are usually between the ages of 36 and 45. The commonest symptom is exhaustion. The sort of persons who become teachers are predisposed to nervous disorders and there are also many other etiological factors, namely alcohol, isolation in a country district without means of enjoyment and lack of rest from working at outside occupations.

4. *Abderhalden Reaction*.—The author believes that the test is not yet useful in psychiatry. The technique is too difficult and the results too uncertain. It is to be hoped that new methods will be devised which will make the test more reliable in the field of mental affections.

5. *Neuroses*.—Many neuroses, so diagnosed by a general physician in a brief examination of a patient, turn out to be phases of an affective psychosis or the beginning of a degenerative psychosis. Neurasthenic states are very rarely of exogenous origin. One nearly always finds stigmata of a psycho-neurotic constitution.

(Vol. 35, No. 5)

1. Perseveration and Other Mechanisms as Causes of Agrammatic Symptoms; Also Remarks on the Relationship of "Slips" of Speech to those of Writing. A. PICK.
2. The Visual Cortex (Area Striata) and its Relations to the Primary Optic Centers. M. MINKOWSKI.
3. Etiology and Symptomatology of Hydrocephalus. W. MISCH.
4. Contribution to the Pathological Histology of Cases of Acute Anterior Poliomyelitis Simulating Landry's Paralysis. E. LOEWY.

1. *Perseveration*.—The author pleads for a closer study of agrammatism and allied symptoms. In a series of illustrations he shows clearly the relationship of perseveration to agrammatism and concludes that the latter is a

temporal lobe symptom. Motor and sensory agrammatism are to be distinguished.

2. *Visual Cortex*.—The literature is reviewed and some of the author's own experimental work described. From numerous experimental observations there is little doubt that the area striata is specifically the receiving station in the cortex for visual impressions and that this function is limited to the location mentioned. As to the cortical distribution from the external geniculate body there is no anatomical material to show its extent in the human species, but Minkowski has found by extirpations on cats' brains that degeneration of the cells in the external geniculate resulted when and only when the striate cortex was ablated. Other studies by Pick, Henschen, von Monakow and others have shown that the anterior portion of the calcarine cortex is associated with the anterior, the posterior with the posterior portion of the external geniculate; also that various portions of the retina are represented in corresponding portions of the optic tract and external geniculate. The histological significance and relations of the different cell-layers in the visual cortex is as yet little understood. It is known that the three superficial layers are not connected with the projection fibers and do not degenerate after destruction of the optic tract. They are probably concerned with the higher elaboration of the impressions received in the deeper layers.

3. *Hydrocephalus*.—For the occurrence of hydrocephalus two factors are requisite: first, a congenital predisposition to increased production of ventricular fluid; second, a mechanical or toxic exciting cause. Traumatism is an infrequent cause. Congenital syphilis is probably more often an etiological factor than can be proven. The increase of the breadth-to-length index is more important in diagnosis than mere enlargement. Epilepsy and intelligence defect are frequent, but are accompanying symptoms and not directly caused by the hydrocephalus.

4. *Polio-myelitis*.—In the two cases described death occurred ten days and eight weeks respectively after the onset. In the more rapid case there was intense hyperemia of the cord and beginning degeneration of the nerve cells. In the other case there was marked infiltration around the vessels and almost complete destruction of the parenchymatous elements. The conspicuous fact in both cases was that the infection obviously reached the cord by way of the blood vessels.

(Vol. 35, No. 6)

1. Severe Symmetrical Gangrene. H. SEELERT.
2. Remarks on von Monakow's chapter on "The Localization of Apraxia" in his book, "Localization in the Brain" (1914). H. LIEPMANN.
3. The Dosage of Absinthe Essence for the Production of Attacks of Experimental Epilepsy in Dogs. W. P. OSSIPOW.
4. Anatomical Findings in a Case of Huntington's Chorea. G. KIESELBACH.
5. Alterations in the Brain in Pernicious Anemia. P. SCHROEDER.
6. A Case of Cerebral Softening. W. N. RUSKICH.
7. The Pathology of Personality Consciousness. A. MUNZER.

1. *Gangrene*.—A man of 59 sustained a severe injury to the testicle which suppurated and was removed. Subsequently gangrene of all four extremities occurred with loss of digits and toes. A satisfactory explanation is not possible but the cause was probably vascular. Temperature hyperesthesia and vasomotor disturbances accompanied the process.

2. *Localization of Apraxia*.—Liepmann indulges in a severe criticism of von Monakow's chapter on the localization of apraxia. He calls attention to misquotations, misrepresentations and a general misconception of the subject. Von Monakow, for instance, quoted Liepmann as regarding the an-

terior part of the corpus callosum as the principal seat of lesions producing apraxia, which the latter claims is a view he never held or put forth. Liepmann takes exception to the differentiation into six forms and desires to show that the localization given in several instances is erroneous. There are many detailed comments and lengthy quotations which do not admit of synopsis.

3. *Absinthe*.—After experimentation the author concludes that the essence of absinthe is a reliable agent for producing experimental epilepsy in dogs and that its dosage can be accurately prescribed. A dose of 0.06 gm. per kilo produces a series of typical epileptic convulsions. A dose of 0.12 gm. per kilo is often fatal.

4. *Chorea*.—The patient, a woman of 50 years, whose brother also had Huntington's chorea, died after four years of the disease and after she had become profoundly demented. The findings in the brain were similar to those described by several other authors. The caudate nucleus and the putamen of the lenticular were the seat of much disintegration from softening. The condition was not due to vascular disease for, although the vessels were markedly thickened, they were not so much so as in some areas where the softening was much less, as, for instance, in the globus pallidus of the lenticular nucleus. In all parts of the brain there was considerable diffuse alteration with occasional small softenings and extremely marked gliosis. The author ventures to suggest that the corpus striatum is the seat of that peculiar coördination, the lack of which produces choreic and athetoid movements. Other lesions which have been looked upon as possible causes of the disease may have acted only by interrupting the path from the corpus striatum through the red nucleus and thalamus. The especial involvement of the putamen and caudate may also be significant.

5. *Pernicious Anemia*.—The author describes minute foci which he has found constantly in the brain in pernicious anemia (he gives descriptions of five cases). These foci are quite different from those which have been described by Lichtheim in the spinal cord in pernicious anemia and they occur only in the brain. They are found most commonly in the marrow near the border of the gray substance. Histologically they are from 100 to 400 micra in diameter and frequently coalesce. They are invariably associated with a small vessel and are surrounded by glia cells. They are not hemorrhagic in nature although erythrocytes usually are found about their periphery. No deductions are drawn as to cause or clinical significance.

6. *Cerebral Softening*.—Brief observations on a case of hemiplegia of no particular significance.

7. *Personality Consciousness*.—A woman of 23 presented the following symptoms: She felt a complete separation of mind and body and lost all pleasure in life. She no longer enjoyed anything nor could she recall past enjoyments. She felt exhausted, unable to do anything and felt that her condition was hopeless. A state of anxiety supervened. The case is discussed psychologically and nosologically and the author contends that the condition is a clinical entity.

J. W. MOORE.

Book Reviews

CALM YOURSELF. By George Lincoln Walton, M.D. Houghton, Mifflin Company, Boston and New York. 50 cents.

Dr. Walton has here presented another of his charming contributions to the joy of living and the festivities of nations. Withal, though a fragment, it is choice and delightful.

JELLIFFE.

AN OUTLINE OF PSYCHOBIOLOGY. By Knight Dunlap, Associate Professor of Psychology in Johns Hopkins University. Johns Hopkins Press.

Dr. Dunlap has prepared a very useful short volume to help the non-medically trained psychologist fill in the gap of his anatomical and biological deficiencies. He stresses the needs for muscle and gland study.

He takes up the study of the cell, the adult tissues of the human body, muscular tissue and its functions, nervous tissues, the afferent and efferent neurons, the sympathetic nervous system, glands, and finally discusses the functional interrelations of receptors, neurons and effectors.

It is this last chapter that attracts our attention, since the former are, albeit very brief and well arranged, well known to the physician. This is a well-conceived and carefully elaborated chapter in which the author adheres strictly to mechanistic conceptions, similar to those so well elaborated and with much detail by Bechterew in his *Objektiv Psychologie* or "Reflexology."

For a simplistic discussion of the chief features of nervous function it may be recommended most cordially.

JELLIFFE.

BEWUSSTSEIN UND PSYCHISCHES GESCHEHEN. Die Phaenomene des Unterbewusstseins und ihre Rolle in unserem Geistesleben. Von Hofrat Dr. L. Loewenfeld, Munich. J. F. Bergmann, Wiesbaden.

In this, one of the latest additions to the series of the *Grenzfragen des Nerven- und Seelenlebens* (No. 89), Loewenfeld gives a scholarly résumé of about 100 pages of the various hypotheses concerning the activities of the unconscious from the time of Leibniz to the present.

No modern student of prominence has been neglected and this short brochure may be recommended to one who is desirous of knowing how the problem of the unconscious has been handled and by whom.

He has much to say concerning Freud's contributions, since these have been most fruitful and occasioned more definite discussion pro and con than any other hypotheses of the past hundred years.

JELLIFFE.

THE INTERVERTEBRAL FORAMEN. By Harold Swanberg. Chicago Scientific Publishing Co., Chicago.

This is a unique atlas. It presents the morphological features of the intervertebral foramina. To the neurologist it will prove of service, particularly in the study of possible arthritides compressing the various nerve roots, which may give rise to various forms of radicular, plexus or peripheral neu-

ralgias or neuritides. A parallel study of X-ray findings would have made the work ideal for the purpose.

JELLIFFE.

SOME AMERICAN MEDICAL BOTANISTS COMMEMORATED IN OUR BOTANICAL NOMENCLATURE. By Howard A. Kelly, M.D., LL.D. The Southworth Company, Troy, N. Y.

Dr. Kelly has not only the sympathy of a common interest with these men of whom he writes, but such an appreciative sense of their personalities and their peculiar devotedness to the science of botany as gives the reader a special charm of acquaintance with the men and their work.

The sketches are for the most part brief and the style sometimes seems more fitted to the lecture form, from which the book grew, than to a finished written product. But the facts are accumulated with care and accuracy and so presented as to awaken the reader's interest, both scientific and personal.

There is but little reference to the more direct service to medical botany, which the title might imply, but a number of other things have been emphasized. It was to these men of science to whom the work in botany appealed, many of them busy practising physicians, active too in other fields of usefulness, some of them again able to give their chief interest and time to natural history. But all appear as indefatigable workers and devoted contributors to the advance of botanical science through the wealth of resources the new continent afforded. Notable also is the close relationship existing between these American botanists and their fellow scientists abroad.

There are two sections of special interest, the one on the life of Asa Gray and his work and that which gives a picture of Dr. Post, the busy missionary physician, working assiduously with the extensive flora of Syria.

The book is one for pleasant reading and opens up new fields of interest, while the author's conviction makes itself felt, that these men have enduring monuments in the various plants that bear their names.

JELLIFFE.

MIND AND HEALTH SERIES. Edited by H. Addington Bruce. Human Motives, by James Jackson Putnam, M.D., The Meaning of Dreams, by Isador H. Coriat, M.D., Sleep and Sleeplessness, by H. Addington Bruce. Little, Brown and Company, Boston.

In the announcement of this promising little series we read:

"As is well known, there has developed during recent years an entirely new department of the healing art, the outgrowth of the discovery of the intimate and subtle inter-relationship between mental and bodily states in the causation and cure of disease. Especially in the United States, France, Austria, and Switzerland, the effort has been systematically made by able physicians, psychologists, and physiologists to determine both the extent and the significance of this inter-relationship; and as a result many surprising facts have been brought to light, facts of profound educational and sociological as well as medical importance.

"Thus far, however, no attempt has been made to present these facts, and the theories to which they have given rise, in a form sufficiently non-technical and at the same time sufficiently detailed to insure a general understanding of them. It is the aim of the present series of handbooks to meet this need, by reviewing in successive volumes the discoveries of the scientific investigators with regard both to general and to specific problems of health and behavior. With this end in view the authors chosen have been selected for their special knowledge of the subjects treated by them, and when completed the series will constitute an authoritative, non-technical encyclopedia of medical psychology, of direct personal and practical value to its readers."

The three works whose titles are here given are the first installments looking towards the carrying out of this most desirable program.

Dr. Putnam's volume is a study in the psychology and philosophy of human conduct, based largely on the author's use of the psychoanalytic method of investigation of mental problems. Besides being of great value for medical purposes, this method, as Doctor Putnam shows, has thrown a flood of unexpected light on human behavior in general, particularly in the way of tracing eccentricities and irrationalities of thought and conduct to forgotten experiences of childhood. Doctor Putnam writes from an ethical as well as from a scientific standpoint, and while his book is of distinct helpfulness to all classes of readers it is especially significant for the physician, the clergyman, the educator, and the parent.

It is a most excellent and readable volume. We know of nothing in this popular vein which is so commendable.

Dr. Coriat's volume on Dreams fails to follow out the scheme. We think he overpopularizes on the obvious features of the dream and becomes highly involved and technical and proxy where he should popularize; furthermore, the reviewer feels he fails to set forth the general value of the dream either as to its educative or liberating function. He has missed an opportunity to give to the dream its proper setting. When Sidney Lanier wrote: "And oft my little leaven, of dream-taught wisdom, works me better years," we think he said more than Dr. Coriat has accomplished in his 150 pages.

The volume on Sleep and Sleeplessness is very entertainingly written. We hold it to be both sound and instructive. Mr. Bruce shows a tendency to quote authors of very uneven value, and to pick out from them comments of a readable nature, even if their medical value is quite secondary.

Nowhere does he show any actual touch with the problem as the doctor has to grapple with it, but for the lay reader who never has enough insomnia to really need a physician the book will prove of great service.

LAURENCE.

THE GERM-CELL CYCLE IN ANIMALS. By Robert W. Hegner, Ph.D. The Macmillan Co., New York.

This volume makes a distinct appeal to the interest even of those not definitely working on the problems of cell structure and development. It concerns itself particularly with these problems in the history of the germ-cell. At the same time it furnishes a clear and concise review of the work that has been done in this field.

The book is the outcome of a year's work in the lecture room of the University of Michigan and embodies results of the author's own experimental studies in the germ-cell cycle in certain animal forms. The accompanying illustrations carefully explained in the text add much to the interest of the book as they make it possible to follow graphically the cycle of development and the behavior of the cell contents, which are of so great importance.

Especial attention is given to the early segregation of the germ-cell in the development of the egg, which seems to bring proof for the theory of the continuity of the germ-plasm. The examples given of the forms studied by various investigators and the conclusions drawn serve to show how little is yet known of the early history of the germ-cells or of the determinants for their development. The author has devoted much of his study to the keimbahn-determinants which under various names have been discussed by many writers. Important questions arise concerning these manifest bodies in the cell as well as concerning other cytoplasmic inclusions studied under the name of mitochondria. The former are perhaps nuclear in origin, but even that is a matter of doubt, while the origin of all these substances, their significance in the cell development, these and similar questions offer fruitful fields for study. The

significance of the nuclear chromosomes as containers of hereditary factors is generally conceded, but there is evidence that the cytoplasmic mitochondria also share in this important function.

Not only must the germ-cell cycle command increasingly the interest and attention of thinkers beyond the field of biology alone, but because the physico-chemical underlies all our physical development the formation of our lower libido areas, forming the first round of even our highest libido striving, this histological scrutiny, morphological and functional, of the germ-cells must be of ever vital interest.

JELLIFFE.

THE HISTORY AND THEORY OF VITALISM. By Hans Driesch. Translated by C. K. Ogden. Macmillan and Co., London.

Mr. Ogden in preparing this book for English readers has had the coöperation of the author in presenting a somewhat new arrangement of the subject matter of *The Science and Philosophy of the Organism* delivered in the Gifford Lectures, 1907-1908, though the historical part remains the same.

Professor Driesch summarizes in a word in his introduction his conception of vitalism and then proceeds to trace the history of this conception in the writings of those who have preceded him in the evolution of philosophical thought, based upon biological investigation and theory, before he develops in the latter part of the book his own theory of vitalism. Teleology, he says, must be accepted. Shall this be due to the laws of the inorganic which underlie life or is there an autonomy in life itself which in the words of Aristotle "determines the origin and development of the organic"? This is the question of vitalism, in brief an acceptance of static or mechanistic teleology on the one hand or dynamic teleology on the other.

Aristotle is chosen as the first exponent of vitalism and a consideration of his position fittingly opens the historical part. For in spite of the naïveté of his biological hypotheses and the primitive state of scientific observation of phenomena in his time, he so carefully weighed his assertions and examined his principles that he has remained an accepted authority until within the nineteenth century. He elaborated a theory of the soul manifested in varying degrees, as the "first actuality" of all living things, which forms and animates the organic body. His vitalism arose from observation, however this was limited. It was in no way controversial as it became under later vitalists, for the materialists had not yet sufficiently grounded their teachings to make them serious rivals.

With the beginning of analytic inquiry into natural processes initiated by Galileo there developed a mechanistic attitude which embraced even philosophy and from which but few pronounced vitalists succeeded in freeing themselves and which drew many from the vitalistic conception of life. The metaphysic of many thinkers was saved from materialism only by the divorce of the spiritual from the realm of the natural.

Professor Driesch finds Kant a vitalist, but one who could not recognize his own position because he had raised certain problems which did not really exist, in his attempt to reduce natural phenomena to phenomena of motion. Teleology to him was a "regulatively judging" teleology, that is merely descriptive, not an inherent teleology. He excepts man, however, from his mechanistic basis and views his activity in a vitalistic sense. Kant's organization and order, conceived as a given ordering principle, may be interpreted as pure vitalism.

Throughout the history of vitalistic thought one is impressed with the confusion of thought that arises from the attempt to put as a governing principle an order already formed, already given. This also obscures biological investigation.

Professor Driesch himself in his exposition of vitalism is not entirely free from rationalism. His explanation lies in a theory of becoming which he first attempts to explain logically and deductively and then examines empirically. There is one type or form of becoming which is a simple combination of elements in the manifoldness of a spatial system of possibilities. This is only a *singular* or *additive causality*. But evolution demands a unifying causation by which new combinations are made. This may be called *unifying* or *individualizing causality*. The non-mechanical agent which is the bearer of this individualizing causality, working with the principles of conservation of energy and intensity of energy, acts by suspending possible change and relaxing suspension. This action depends, however, on given, preformed, material conditions. This bearer of individualizing causality is named *entelechy* and defined as "neither an energy nor 'a material substance' of any kind," but as "an agent *sui generis*, non-material and non-spatial, but acting into space, so to speak; an agent, however, that belongs to nature in the purely logical sense in which we use that word." May this not be a sign of but a greater system, a "vital system" of relations of which we do not possess knowledge, by which would be established a monism for the apparent dualism of nature, a suprapersonal unity of which this one known system is only one part? The apparent predetermination of becoming may then signify only the limitation of the human mind. The final unanswerable question resolves itself to this. Is there a freedom of undetermined becoming running through the totality of individuals creating something new in the becoming, or does an immaterial suprapersonal agent allow only a new materialization of a manifoldness already existent? Here the author leaves us to belief and to accept whichever postulate is pragmatically necessary to our conception.

JELLIFFE.

THE NEW PSYCHIATRY. By W. H. B. Stoddart, M.D., F.R.C.P., Baillière, Tindall and Cox, London.

Stoddart has put into a convenient form the Morison Lectures delivered by him at the Royal College of Physicians of Edinburgh. They form a useful handbook of the elements of psychoanalysis and their application in practice. They include a comprehensive survey of these principles, even though in a very brief discussion of them. Stoddart gives psychoanalysis the recognition of its true place in a sincere and therefore effective understanding of human nature which it has been slow in gaining among his British colleagues. Perhaps this reluctant acceptance has led him to appeal in the popular elementary manner which is the style of the book. The book should make a ready appeal to all those who would know something of these principles, methods and aims of the new psychiatry. Stoddart gives it the support and illumination of his own successful experience with it. Occasionally he departs from the strictly Freudian terms and introduces to a slight extent his personal adaptation of certain concepts, as when he prefers to lay greater stress than is usual on the subconscious, by which he means Freud's "fore-conscious," and thereby introduces a somewhat more extensive division in the unconscious sphere of activity. On the whole, he presents the subject with an understanding and appreciation which should win it recognition and confidence.

JELLIFFE.

The Journal OF Nervous and Mental Disease

An American Monthly Journal of Neurology and Psychiatry, Founded in 1874

Original Articles

ACROPARESTHESIA*

BY JAMES J. PUTNAM, M.D.

The subject of acroparesthesia is so familiar to all the members of this society that I should not ask your attention to it further but that I wish to use it as a text for some remarks about the nature of the *neuroses* in general, and wish also to make what contribution I can to the subject of treatment of this special ailment. Everything of this latter sort should, I think, be welcome; for in some of its features this affection is a cause of great suffering, which it is difficult to relieve.

I feel the more inclined to bring up again the problem of pathogenesis of this disorder because in consulting the excellent Text-book of Neurology by Jelliffe and White, I find a view taken as to its nature which I believe to be erroneous. They state, namely, following the lead of Pick and some of the French writers,¹ that the disorder is based on an inflammation of nerve roots, which is occasionally of syphilitic origin. That such changes in nerve roots, or in nerves at one or another portion of their course, do, indeed, occur is, I believe, quite likely, though as yet unverified. In my judgment, however, these neuritic changes are either secondary, or when primary, are to be classified as exciting causes of a disorder which, in itself, is a functional neurosis.

My own interest in this subject began nearly forty years ago;

* Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

¹ Cf. Dejerine and Egger; Bouchard.

for in 1880 I published a group of thirty cases, in which I gave what might be called a typical history of the affection. This was the first time that the discussion of acroparesthesia as a clinical entity had been attempted, although Nothnagel had published, not very long before, a study of vasomotor disorders in general, in which he referred incidentally to this affection. The name acroparesthesia was given by Schultze, my designation having been "recurrent numbness." I did not know of Nothnagel's publication when I wrote, nor was I aware that several passing references to what one may now assume to have been the same disorder had been brought out even earlier (Jones, Martin, cf. bibliography).

With a view to arriving at just conclusions on the various points involved I have recently reviewed carefully the whole literature of the subject and also my own experience with a small group of cases (nineteen in number) which I have seen in private practice during the past few years; and I have supplemented the information thus obtained through the consideration of certain physiological and psychological observations to which I shall presently refer. I have seen a large number of cases in hospital practice, but these are not here taken into account.

The first question that presents itself is whether we have to deal primarily, in acroparesthesia, with a neurosis or with an organic inflammatory lesion; and if with a neurosis, in what sense this is to be understood.

By far the larger number of the writers on the subject regard the affection as primarily a neurosis, and one in which the vasomotor system is usually at fault, though perhaps only conjointly with the sensory system. Every one admits, however, that neuritis may occur as a secondary phenomenon, and various observers have been greatly struck, as I have been, with the frequency of occurrence of arthritic, or peri-arthritic, changes in the phalanges. As regards the neuritic conception, this is due, as Jelliffe and White say, to Pick; and his argument, like that of Dejerine and Egger and a few others who have followed them, is based on the observation that the distribution of the subjective sensory symptoms, and still more of the objective disorders of sensibility (which though slight are occasionally well marked), corresponds to nerve root areas or to segmental areas. This argument seems especially impressive for those cases where the disorders of sensibility extend up the whole length of the arm and into the shoulder-girdle.

But the presence of signs like these gives us no information as to whether the nerve roots are the seat of a primary inflammation

[extra- or intra-spinal], or whether the first thing that happens, even to them, is a disorder of the circulation. It is to be recognized, however, that toxemias may play a certain part, and it is entirely possible that what we clinically call acroparesthesia is not always a disease of one and the same sort.

The safest way to lay a foundation for a good theory of the disease, especially so long as anatomical observations are lacking, is to fix the attention at first on the early, and what might be called the most typical, symptoms; and if we do this we find that we have to deal with a group of phenomena which few persons would feel inclined to refer to neuritis or radiculitis as their cause. Occasionally, too (Gilbert Ballet; Collins; Cassirer), not only the hands and arms but the lips and tongue feel numb. These early and typical symptoms are paroxysmal and periodic in occurrence, almost exclusively sensory, and the subjective element in them is much more prominent, as a rule, than the objective. They are attended so often with disorders of the circulation—even if of slight amount—that one has the right to consider a vasomotor neurosis as constituting an almost essential feature of the affection. It is also noteworthy that these symptoms usually occur, at first, in the early hours of the morning—that is, in the pre-waking period, or coincidently with waking—and that the numbness is easily intensified, or brought on, by local excitation of the hands, as by cold or hot water, or again, by the pressure of a thimble or the use of the fingers, as in sewing, or by muscular efforts. Furthermore, most of the patients are of at least slightly (sometimes markedly) neurotic temperament, and usually of an age (involution period) when fatigue or disorganization symptoms are most common. This affection does, however, occur at times in childhood (cf. Savill and others). One of my patients was a nervously unstable child of eleven years.

There is one other fact that calls for special comment. This disorder, by virtue of its regular recurrence (I still speak of fresh and early cases), is an example of what one calls "habit," but what deserves a more scientific name. The "habit" may be set up by a single powerful traumatic stimulus and quite often, I believe, by repeated lesser stimuli acting, presumably, by summation. In two cases (Sommer) this stimulus was a crushing of the fingers; in another (Oppenheim) it consisted in the exposure of the heated fingers to extreme cold (ice), while the effect of repeated immersions in hot water or cold water has been observed by many authors. Such conversion of the effects of a single stimulus into a recurrent process, is, I think, of distinct scientific interest.

In my first paper I offered the hypothesis that the nerve terminals themselves might possibly possess a vascular system which was independent of that of the overlying skin, inasmuch as the paresthesia, while very often accompanied by changes of color in the skin, stands in no sort of direct proportion to this change of color. Whether this hypothesis is sound, or not, I cannot say, but as a hypothesis it is still worth mentioning. There is very good reason to believe that with certain persons a very slight amount of irritation of the nerves will suffice to bring on this sense of numbness. Every one must have noticed that patients suffering from mild and chronic forms of myelitis find that very slight pressure on the leg nerves, as in crossing one knee over the other for a brief period, will bring on this symptom; and I, myself, have many times observed, when walking on a hot day, with a knapsack or bag hanging from the shoulders, or with a somewhat too heavy overcoat, that the fingers, especially of one hand, would presently become very uncomfortably numb and stiff, just as they are described as being by acroparesthetic patients. Furthermore, in my own case, I have found that it is the thumb or the thumb and forefinger—in other words, the skin corresponding to the whole or a part of the median nerve area—that is usually first to be affected. Even to let the arm hang down at any time, or, on the contrary, to hold it up over the head, is often enough to bring on a certain degree of paresthesia. Whether under these circumstances it is the over-sensitiveness of the nerves or that of the nerve centers which is at fault, or whether the slight pressure induces a disturbance of the circulation, must be left in doubt. But it is certain that the amount of circulatory change required to induce the paresthesia may be very much less than that required to induce a change of color in the skin.

When one considers the character and history of these early symptoms as a whole, it seems unnecessary to invoke a neuritis or radiculitis as a primary affection, for a diagnosis applicable to the majority of cases, and still less necessary to assume that the posterior columns of the cord are primarily involved, simply because of the radicular distribution of the symptoms.

One of the cases reported by Dejerine and Egger seems certainly to belong to that group of diffuse spinal degenerations such as so often attends pernicious anemia, and is seen also, not infrequently, with less serious disorders of general nutrition and even independently of these. The paresthesia is here symptomatic of a condition which is not present in acroparesthesia of the usual type. The same criticism may be offered, and with even greater justification, for the case of Bruns.

Almost all the American writers have regarded the affection as a functional neurosis, and consider it, in general terms, as of vascular origin and related to the other angio-neuroses. Solis-Cohen, while adopting the same view, has broadened the outlook somewhat by the use of the conception implied in the term *vasomotor ataxia*, his idea being, as I understand, that whereas the circulatory mechanism (I use the name "mechanism" as a matter of convenience only, and not as implying a theory of localization), when at its best, is capable, by virtue of its adaptations and its adaptability, and by virtue of the coördinated activity of its various elements, of securing to the tissues the materials for nourishment and stimulation under various and varying conditions, yet it is peculiarly liable, like any complex mechanism, to fail to work exactly as it should. But what principles govern the failure to maintain this functional activity at its best?

It would involve no criticism of the view which Dr. Cohen states with much clearness and ability, to suggest, as has been done, the possibility that this neurosis may affect something more than the vascular apparatus, as presumably happens in migraine. In fact, it is highly probable that just as the various functional mechanisms of the body in health play necessarily into one another, so the substitutes for these mechanisms do the same. It would, however, be possible to assume that the pain so often present is in immediate relation to the sensory apparatus of the vessels (cf. Cassirer, "vaso-sensory" excitation).

A similar view to that of Solis-Cohen—which is in harmony with the views of Collins and of Sinkler—is taken by most of the German writers, among whom I will refer only to Curschmann and, especially, to Cassirer, whose book and whose recent article in Lewandowski's *Handbook of Neurology* give perhaps the best statements that have been published on the subject. I would maintain the same sort of view as explanatory of the most typical cases, but suggest that we ought to make more of the relationship between the predisposing causes and the exciting causes, and of that between this comparatively localized neurosis and the psychoneuroses, than has hitherto been done, and in a sense that I will indicate.

To do justice to this problem one should consider what place the groups of symptoms really hold to which we give the name of "neuroses." We have long been used to look on them and to speak of them as "diseases," that is, as occurrences out of relation to the normal course of life. But this way of thinking is distinctly unproductive.

Every one would admit, I suppose, that the functional derangement of any mechanism points strongly to the existence of a normal arrangement or situation for which the disorder, whatever its symptoms may be, offers itself as a substitute, though it may actually appear as the *caricature* of a substitute. The principle seems to be that when a given mechanism proves, for any reason, inadequate to its task, one or more relatively inferior mechanisms step in, though not necessarily as representing mechanisms which supply fully the place of their superior. This law might well bear the honored name of Hughlings Jackson, who wrote so well about it; and I remember with pleasure that the examples with which he used to illustrate it were apt to be taken from the field of human behavior, that is, from what would nowadays be called "morbid psychology." Daily life abounds in sequences of this sort, to the extent that to cite instances is needless. This principle has not been well worked out for the case of the neuroses, but in the history of the psychoneuroses (hysterias, etc.) it has found abundant application. The "symptoms" of these disorders are better considered as substitutive mechanisms, which have a certain positive value and present evidences of a complex history; and my suggestion is that the rich treasury of facts and principles laid bare through intimate study of them should be made to yield suggestions for the study of the neuroses—as migraine, the epilepsies, the neuralgias, and so on. Such affections are not representative of any particular normal process or mechanism, but they are processes and mechanisms which come in to fill, after a fashion of their own, the place which the more nearly normal state had balked at attempting to fill more adequately.

I have no doubt that we shall one day find the law that decides why one patient suffers from migraine, another from acroparesthesia, and a third from both; combined, perhaps, as in the cases reported by Curschmann, with a functional angina pectoris.

Common to nearly all of these neuroses is the fact that they occur on the basis of a neurotic, an unstable temperament, the characteristics and causes of which can be defined to-day, thanks to psychoanalytic investigations, better than it had previously been possible to define them. Common to all of them, also, is their more or less paroxysmal mode of occurrence, and the fact that habit plays a large part in their persistence. But "habit" is itself a symptom, the analogue of which, in the mental sphere, may often claim the name of "wish." (Freud, *Int. Zeitschr. für Aertzliche Psychoanalyse*, 1916, I.) In brief, every nervous symptom should be regarded as an attempt—abortive, in one sense—to do something

that is needed, and its nature should not be obscured by designating such symptoms purely and simply as evidences of disease. The too free use of the words "illness" and "disease," convenient and even necessary as they may be, carries with it implications that are unfortunate. It should not be enough, in the eyes of the scientific student, to say that this or that patient has migraine, or epilepsy, or acroparesthesia, as if we were dealing with phenomena that had no history and bore no relation to the history, from infancy onward, of the individual who suffers from them. On the contrary this history should be studied with great care, even, if necessary, by the aid of the method of personal investigation now getting to be so familiar and of such acknowledged usefulness. ¶

I have now under my observation three patients whose cases may serve to illustrate the importance of the principle which I seek to advocate.

The first of these is a lady of fifty-five, who has suffered for about a year from recurrent paresthesia in a typical form, mainly affecting the left hand, sometimes the right, and to a slight degree the feet. The two middle fingers of the left hand are most strongly involved.

The principal point to which I wish to call attention in the case is this: The recurrent numbness was ostensibly brought on, as has so often happened, by having the hands immersed a great deal in cold water, while working in her dairy. On further inquiry, however, it appeared that she had been under a severe strain for several years, on account of the death of her only son, a promising young man of about twenty, to whom she was devotedly attached. Indeed, she had purposely kept herself in a state of activity and high tension in order that she might not have a chance to brood over her trouble. Nor was this all; for further inquiry showed that in spite of looking strong and well she had been all her life of a highly nervous temperament. Also the blood pressure was found to be high, and she was troubled somewhat by constipation. It is of further interest that a slight excitation of the skin, as in passing her hands over rough surfaces, or lifting moderate weights, or putting on a thimble and taking a few stitches, will now intensify the trouble, especially in the thimble finger.

I regard this history as typical; but instead of interpreting it by saying, as would usually be said, that all these different causes converged to produce the paresthesia, I suggest, as a more accurate statement, that the first thing that happened, logically speaking, was a sense of strain—due to general nervous temperament and severe

grief—leading, presumably, to a relative rupture of physiological coördination in the nervous system; and that, as a secondary result, the local irritability of the nervous system was given an opportunity to assert itself. Of course, one must assume, also, some special causes, analogous to those here mentioned but on another and relatively physiological plane, to account for the special form of the special symptoms here at stake.

The second case is that of a lady in the prime of life, and in excellent physical condition, in whom the paresthetic tendency (not altogether typical in form, but corresponding in the main to the usual type) showed itself at the end of a month of very hard work at writing, which she had done partly as a matter of pride, partly from the desire to accommodate a friend—her former physician—for whom she acted as over-willing secretary. The development of the case under rest has made it clear to me that the symptoms are in a measure analogous, as regards causation, to those met with in the traumatic neuroses; and, as in the majority of those cases, this patient had a distinctly neurotic temperament, and had been under treatment for that reason.

The third case is one where the arthritic tendency is very marked in both hands, and here the numbness continues more or less all through the day, or is easily brought on, especially by sewing and by writing. Here also the general neurotic tendencies are in evidence; and, in fact, the patient was for a number of years under almost constant treatment in a hospital for the insane.

I speak of these cases, partly because their features happen to be before my mind, partly because they are obviously unselected. The point which I wish to emphasize is the familiar one, that with a marked instability of the nervous system we may see outcropping tendencies of a great variety of sorts. And I wish to make it clear that we can learn more about the real sequence-tendency if we keep carefully before our minds the very striking history of the psychoneurotic patients whose illnesses have been studied so thoroughly of late.

In the course of searching for conditions which, although occurring among persons in relatively good health, might be considered as more or less related by analogy to acroparesthesia, I have consulted the physiological literature of the phenomena characteristic of night or sleep, also the physiology of inhibition, and have taken under consideration whether one might not get further hints of value from the very important observations which the recent psycho-analytic investigations have brought to light.

The most important of the recent contributions to the physiology of sleep and its phenomena seems to be a paper by the physiologist, Dr. W. D. Howell, of Baltimore, who reported, in 1897, a number of careful and highly interesting experiments made upon himself with the plethysmograph. These observations confirmed the earlier statements by Mosso which indicate that the vascular tonus falls during the night, but showed, in addition, that the circulation in the arm—as indicated by the changes in volume registered on the moving drum—passes through several important changes. Up to about midnight, that is, during the first few hours of sleep, the circulation is diminished and the tonus low. From this time onward, and especially toward morning, the vascular tone increases slowly, but for a short time before, and at the moment of waking this increase may become very rapid, indeed almost conclusive, the vessels contracting considerably while still retaining their tendency to oscillate.

I am not prepared to maintain positively that these changes toward the latter part of the night and at the moment of waking stand in any definite relation to the phenomena of acroparesthesia; but it is a striking fact that the incidence of the two sets of phenomena is very much the same so far as the time of their occurrence is concerned.

The next series of facts which would seem to me important are those which the study of dreams has helped to establish on a firm foundation. It has been demonstrated positively that the general significance of the psychoneuroses, and likewise of dreams, is that they indicate a reversion to types of mental life which might be called "caricatures" of one or another phase of childhood. It would seem that every person, at all times, is exposed continually to the influence of two conflicting sets of impulses, one of which tends to lead him onward in the direction of coördination on a broader plane, while the other tends to hold him back, and to cause him to embrace, with more or less positive intensity, the tendencies relatively characteristic of his immaturity and childhood.

It is not necessary to describe these phenomena at length, but I think no thoughtful person would be inclined to deny the truth of the general proposition.

If, now, one looks still more carefully at the clinical phenomena of sleep, one finds a number of pieces of evidence which are significant in this connection. In the first place, we have the interesting series of observations by Dr. Weir Mitchell, with which every one is more or less familiar, namely, night palsy and the night numbness. The latter is substantially the very state which we are now con-

sidering, while the night palsy is undoubtedly the analogue of the dream.

Then there is the interesting fact of the spasms of the unstriped muscles, occurring during sleep and especially toward the hour of waking. I refer particularly to the spasm of the bladder, leading to a desire to micturate, and the spasm of the sphincter ani, attended, at times, with severe pain. The tendency to both of these occurrences may be described, I believe, in the terms which I have already used, namely, as indications of a reversion toward more primitive forms of reaction, no longer of economic usefulness but physiologically of positive interest and significance. This seems to me a point of considerable importance. If any one has studied this bladder phenomenon in his own case, as I have, he will probably have noticed that if the inclination to micturition is resisted for a time it may soon and completely pass away, indicating that the condition that was being dealt with was one of temporary contraction (over-active response) of an organ by no means over-filled.

The *aim of treatment* in cases of acroparesthesia should obviously be several-fold in character. Every one would agree that it is important to restore the tone of the nervous system as a whole, and that an approach toward this end may be made along several lines at the same time.

In the first place, the general hygiene should be attended to and appropriate indications followed of special tonic sorts. I have been in the habit, for many years, in this as in other forms of impaired nervous tone, of giving *nux vomica* in increasing, and eventually large doses,² and have found it very useful. It is needless to speak of other tonic remedies in detail, and I will only say that I think it would be worth while, though I have not tested its effect, to use specific extracts of the ductless glands in cases where the menopause forms one of the predisposing causes.

In the next place, the possibility of the elimination of emotional complexes must be considered; and this may be done with such means as the physician has at his command.

As a third indication, the means of the removal of toxemias may be mentioned, and I can here report briefly a case of unusual interest:

The patient was a lady of sixty, married, but without children. Her facial expression seemed suggestive of myxedema, though I

² Twenty-five to thirty drops three times daily as a final dose, if well borne.

may say here that the use of thyroid gave her no relief. The pain in this case was exceedingly severe. It affected mainly the hands, and was associated with impairment of sensibility, such as made it difficult for her to hold a pin or to button up her clothes. The numbness was greatest in the second fingers and the thumbs, whereas the two smaller fingers were scarcely involved at all. The skin of the hands felt hot, and the nails were brittle. The blood-pressure was 160-100. The pain and numbness were present not only in the night, but through the day. The patient lived a long distance out of the city, and I saw her only infrequently. But the results of such treatment as I gave her were discouraging, and I finally called in Dr. David Edsall in consultation, and was glad to assent to his suggestion that she should enter the Massachusetts General Hospital for further observation of her case. Here she was subjected to every sort of test, and treatment of several kinds was tried, but all to no purpose. Finally she left Boston and I did not hear from her for some months. Then she wrote me that she had tried a very thorough colon irrigation, at the suggestion of a friend, and that after following this up for a month her hands began to be relieved. The improvement went on steadily until after a few weeks more her condition became entirely normal. She continued to use the irrigation more or less, at longer intervals, however; and whether from this cause or not she was able to write me again, about six months later, that her trouble, which she had had for seven months previous to this treatment, had never returned.

In this connection the tendency to arthritic changes in the phalanges of the fingers should be noted, and means used to remedy, so far as practicable, the conditions leading to this tendency.

Next comes the question as to what one should do with reference to a particular stimulation, such as exposure of the hands to water and the use of the muscles of the affected parts. It is my belief that while one ought at first to advise the avoidance of these sources of excitation, it is also important that the patient should be trained to endure them without harm. For this reason I believe it is probably advantageous (though I speak more on theoretical grounds than from experience) that water applications should be used in such a way as to promote the circulation, care being taken to see that this result is brought about. If vascular reflexes may be made to occur more normally through being trained to meet specific needs, I feel sure that the abnormal responses would be less likely to occur. On similar grounds I should encourage muscular exercises of a vigorous sort, so far as they are well borne, and, particularly perhaps,

slow, muscular-tension exercises, through which the flow of blood to the muscles is certain to increase. I have also found the application of heat by the systematic and thorough use of a Leucodescent lamp to be of very obvious service in some cases, while in others it has wholly failed to help. The same statement may, I think, be made about electricity in its various forms.

It seems unreasonable to lump these various forms together, but all of them have been found useful, and no attempt has been made, to my knowledge, to differentiate adequately among them.³

I should like to say a few words, based on personal experience, about the use of quinine. This has been employed in two ways, namely, in small, so-called tonic doses, combined perhaps with arsenic and iron, and in relatively massive doses, especially at bedtime. This latter method was first employed by Bernhardt, many years ago, but I took it up without knowledge of his experience. There is no question that this drug, when given in doses of ten or fifteen grains, or even more, is exceedingly beneficial when the numbness is present in a paroxysmal form. But I do not believe that one does wisely to continue it for very long, or that one can use it as a final remedy. The benefit to be derived from it is rather of a similar sort to that obtained through the same means in the typical neuralgia of the superorbital branch of the fifth nerve, with which I have had a considerable experience, both in my own case and with others. I have at different times used quinine, myself, in single doses up to 25 grains at bedtime, and can say that while the results are often very striking, the final effect is rather to postpone an attack than really to cure it. The history of this form of neuralgia (which I have with good reason called "migranoid") is analogous to that of acroparesthesia in the respect that when once the habit has been formed, say as the result of a catarrhal inflammation of the frontal sinus (which is a common cause), it may continue long after this particular cause has passed away.

In acroparesthesia, then, I should expect no more of quinine than that it might help to break up a morbid habit, and I have used it only for that purpose, giving a large dose on three successive nights and repeating this treatment once a week.

³In the course of the discussion (q.v.) following the reading of this paper, Dr. Hugh Patrick of Chicago referred to interesting observations of his own indicating that the elastic ligature (modified Bier treatment) is often of great value.

BIBLIOGRAPHY

- Armandin. Contribution à l'étude de l'acroparésie. Thèse de Paris, 1899.
- Ballet. L'acroparésie. La semaine médicale, 1895, XV, p. 473.
- Baupp. Acroparésie avec troubles à topographie radiculaire et dissociation de la sensibilité. Revue neurolog., 1904, p. 98.
- Berger. Breslauer Ärztliche Zeitschrift, 1879, s. 60.
- Bernhardt. Ueber eine weniger bekannte Neurose der Extremitäten, besonders der oberen. Centralbl. f. Nervenkrankh., 1886, IX, No. 2, s. 33.
- Bouchaud. Un cas d'acroparésie avec troubles de la sensibilité objective à topographie segmentaire. Revue neurolog., 1904, p. 826.
- Brissaud et Londe. Acroparésie, tétanie, fluxion goutteuse. Revue de médecine, 1901, p. 545.
- Bruns. Neuropathologische Mitteilungen. All. Zeitschr. f. Psychiatrie, Bd. 56, s. 799.
- Buzzard. Some Forms of Paralysis Dependent upon Peripheral Neuritis. The Lancet, 1885, II, p. 983.
- Cassirer. Die vasomotorisch-trophischen Neurosen. Karger. Berlin, 1901. See also article in Lewandowsky's Handbuch der Neurologie.
- Chabat. Thèse de Lyon, 1896.
- Collins. JOURNAL OF NERVOUS AND MENTAL DISEASE, August, 1893.
- Collins. The Paresthetic Neurosis. Boston M. and S. Jr., September, 1893.
- Collins. Acroparésie (the Paresthetic Neurosis), the Analysis of One Hundred Cases. N. Y. Med. Rec., 1901, 61, p. 844.
- Curschmann. Ueber Angina Pectoris Vasomotoria. Deutsch. Zeitschr. f. Nervenheilk., XXXVIII, 1910, p. 211.
- Dejerine et Egger. Les troubles abjectives de la sensibilité dans l'acroparésie et leur topographie radiculaire. Revue neurolog., 1904, p. 54.
- Edgeworth. Acroparésie. The Lancet, 1900, I, p. 1795.
- Egger. L'acroparésie, Une lésion du cordon postérieur. Rev. Neurologique, 1906, XIV, p. 174.
- Eulenburg. Realencyklopädie, 1894, 3. Aufl., Bd. I, s. 546.
- Ferio. Sull acroparésie. Il Morgagni, 1894, p. 201.
- v. Frankl-Hochwart. Akroparästhesien, Nothnagels spez. Patholog. und Therapie, 1908, XI, 2, II. Aufl., 1904.
- Friedmann. Zur Akroparästhesie. Deutsch. Zeitschr. f. Nervenheilk., 1893, IV, s. 450.
- Fry. Acroparésie. Phila. Med. Jr., 18, X, 1902.
- Glorieux. A propos de l'acroparésie. Ann. de la polyclinique de Paris, 1896.
- Haskovec. Ueber die Akroparästhesien. Wiener klinische Rundschau, 1898.
- Howell. Jour. Exp. Med., 1897, II, p. 313.
- Laquer. Ueber eine besondere Form von Parästhesien der Extremitäten (Akroparästhesien Schultze). Neurolog. Centralbl., 1893, XII, p. 188.
- Lesem. Acroparésie, a Study of Two Hundred Cases. Med. Record, 1906, LXX, p. 337.
- Lévi et Wormser. Névrite sensitivo-motrice des extrémités par abus forcé de bicyclettes. Revue Neurolog., 1904, p. 1219.
- Möbius. Behandlung der vasomotorisch-trophischen Neurosen. In Penzoldt-Stintzing's Handbuch der spez. Therapie, Bd. V, s. 492.
- Luzenberger. A. d. Parte medica, 1899, I, No. 40.
- Mohr. Bonner Dissertation, 1890.
- Moir. A Special Form of Numbness of the Extremities. The Lancet, 1885, II, p. 595.
- Nothnagel. Deutsches Archiv für klinische Medizin, II, s. 173.
- Oppenheim. Lehrbuch der Nervenkrankheiten. Berlin, 1902, 3. Heft, s. 1140.
- Ormerod. On a Peculiar Numbness and Paresis of the Hands. St. Bartholomew's Hosp. Rep., 1883, p. 17.
- Pfeiffer. Berliner klin. Wochenschr., 1891, No. 15.
- Pick. Remarques sur la pathologie des acroparésies. Revue Neurolog., 1903, I, p. 12.
- Putnam. Series of Cases of Paresthesia, mainly of the Hands, of Periodical Recurrence, and Possibly of Vasomotor Origin. Arch. of Medicine, 1880.

- Rosenbach. Die Auftreibung der Endphalangen der Finger, eine bisher noch nicht beschriebene Trophische Störung. *Centrab. f. Nervenheilk.*, XIII, 1890, s. 199.
- Raymond et Courtellemont. Névrite professionnelle chez un cocher. *Revue Neurolog.*, 1904, p. 500.
- Sommer. Akroparästhesien nach Traume. *Berliner klin. Wochenschr.*, 1902, 40, s. 929.
- Saundby. On a Special Form of Numbness of the Extremities. *The Lancet*, 1885, II, p. 422.
- Savill. A Clinical Lecture on Acroparesthesia, Erythromelalgia, Sclerodactylia and Other Angioneurotic Disturbances. *The Lancet*, 1901, I, p. 1513.
- Schmidt. Zur Klinischen Pathologie des peripheren Nervensystems bei Lungen Tuberculose mit spezieller Rücksicht auf Akroparästhesien. *Wien. klin. Wochenschr.*, 1899, s. 721.
- Schultze. Ueber Akroparästhesie. *Deutsch. Zeitschr. f. Nervenheilk.*, 1892, III, s. 300.
- Schultze. Ueber Akroparästhesie. *Deutsch. Zeitschr. f. Nervenheilk.*, 1893, III, p. 300.
- Shaw. Vascular and Toxic Acroparesthesia or Sensory Disturbances of the Extremities Occurring Independently of Primary Disorder of the Nervous System. *The Practitioner*, 1903, p. 756.
- Sinkler. On a Form of Numbness at the Upper Extremities. *Phila. Med. Times*, 1884.
- Sinkler. The Treatment of Acroparesthesia (Numbness of the Extremities). *Medical News*, 1894, II, p. 178.
- Solis-Cohen. Vasomotor Ataxia, A Contribution to the Subject of Idiosyncrasies. *Am. Jour. Med. Science*, Bd. 107, 1894, p. 130.
- Sternberg. Die Akromegalie.
- Weber. Sensory Tetany, Vasomotor Tetany. *British Med. Jour.*, 1911, 25, II.
- Weir Mitchell. Lectures on the Diseases of the Nervous System. *Med.*, 1887, p. 181.
- Windscheid. Die Pathologie und Therapie der Klimakterischen Neurose. *Deutsche Praxis*, 1897, 7.
- Wolfensohn. Contribution à l'étude de l'acroparesthesie. *Thèse de Paris*, 1899.

RECURRENT POLIOMYELITIS; SECOND ATTACK AFTER A PERIOD OF THREE YEARS*

BY E. W. TAYLOR, M.D.

BOSTON

(*From the Neurological Clinic, Massachusetts General Hospital.*)

The question of the possibility of a second attack of poliomyelitis is both of theoretical and practical interest. It is generally recognized and undoubtedly true that a definite immunity results from an attack of the disease. Whether or not this principle is absolutely without exception remains a matter of doubt. Evidence appears to be accumulating, slowly it is true, that the disease may repeat itself in the lifetime of an individual at a varying interval of time, from months to years. Inasmuch as recent investigation has shown that the virus of the disease may be recovered from the throats of individuals or experimental animals many months after the onset of the disease, it is altogether probable that an exacerbation of an original attack may occur without the necessity of presupposing an entirely new infection. Whether the virus may be carried for years in an individual is certainly a possibility, as shown by the probable existence of carriers in this disease as in others, typhoid fever, for example;^{1, 2, 3} but no demonstration is as yet forthcoming that such a virus may take on a form sufficiently virulent to cause a second attack in the same individual. The only other explanation is a reinfection, which in general appears to controvert the generally accepted principle of immunity.

On this subject Wickman states that the initial symptoms of the disease may develop in two stages and occasionally that the second stage may be regarded as a relapse (*Rezidiv*) after the patient has recovered from the first attack. Such cases have been reported.

* Read by title at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

¹ Osgood and Lucas, Transmission Experiments with the Virus of Poliomyelitis, Jour. Am. Med. Assoc., 1911, LVI, 495.

² Kling, Pettersson and Wernstedt, Investigations on Epidemic Infantile Paralysis, Report from the State Medical Institute of Sweden to the Fifteenth International Congress on Hygiene and Demography, Washington, 1912, pp. 84 and 133.

³ Lucas and Osgood, Transmission Experiments with the Virus of Poliomyelitis, Jour. Am. Med. Assoc., 1913, LX, 1611.

the interval between attacks varying from weeks to months. These cases of relapse, according to Wickman, offer a certain contradiction to clinical and epidemiological experience as well as to experimental investigation, all of which teach that after a single infection immunity is established.⁴

Müller,⁵ writing in 1910, makes the definite statement that except for relapses in fresh cases, he has been able to find no example of a second attack of poliomyelitis. He quotes also Wickman as saying that he knows of no such cases.

Flexner and Lewis⁶ from the experimental standpoint reach the general conclusion that a second attack rarely if ever occurs, for the reasons that one attack appears to confer lasting immunity, and that attempts to re-infect monkeys recovered or recovering have failed, whereas the virus used always produced infection in control animals. How enduring such immunity may be is still to be determined.

In general, both on theoretical, experimental, and clinical grounds, it appears evident that one attack of the disease results in a practical immunity. It is, therefore, all the more important to determine if possible whether such immunity may be regarded as a universal principle or whether, under certain circumstances as yet not understood, the disease may actually, not as a relapse, but *de novo*, repeat itself in an individual. It is desirable that cases bearing on this point should be published. The case here reported seems definitely to bear out the possibility of a second attack.

V. K. S., of Webster, N. H., a boy of 7, was referred to the neurological department of the Massachusetts General Hospital, December 11, 1915, and gave the following history. At the age of three months, the child had what was called cholera infantum, from which he made a good recovery, and was well until three. He was then taken ill with what appears to have been an urticarial eruption, described as "red blotches," which disappeared in two or three days. Shortly after this, he became somewhat drowsy and developed fever, which lasted for three days. Following this acute febrile attack, he had weakness of the right leg and left arm. He had been perfectly well able to walk before this attack came on but thereafter for a considerable time was obliged to creep. The left arm quickly recovered, so that he was able to pick up objects within a few weeks. He was able to walk again in one year, but the right leg has never entirely recovered.

⁴ Wickman, Die akute Poliomyelitis, Handbuch Neurologie, Lewandowsky, 1911, II, 854.

⁵ Müller, Die spinale Kinderlähmung, Berlin, 1910, p. 15.

⁶ Flexner and Lewis, Experimental Epidemic Poliomyelitis in Monkeys, Jour. Exp. Med., 1910, XII, 227 (243).

Second attack: In September, 1914, three years after the previous attack, at the same time of year, the boy was again attacked in an entirely similar way, with headache and fever, followed by questionable convulsions. He then improved for several days, when another accession of fever occurred. He slept restlessly that night, and on awakening the following morning, was extensively paralyzed. He was practically unable to make any voluntary movements. In one week, improvement began, especially in the left arm and right leg. He was, however, unable to walk for six months. In the last three months, he has markedly improved.

The child, when examined at the Massachusetts General Hospital, on December 15, was rather poorly developed and nourished. His tonsils were large, his teeth poor, the lungs, abdominal organs, and heart negative. The spine showed a slight left dorsal scoliosis. Muscular defect was widespread. The left leg was in general greatly atrophied and flail-like. In standing, the entire weight was borne on the right leg. The left foot was held in position of equinus. Very slight power remained in the quadriceps or hamstring muscles. The sartorius was fairly preserved. There was some power in the rotators; adduction was strong. There was no power in the foot muscles or in the gastrocnemius. He walked by drawing the leg up with the hamstrings, and throwing it forward with the psoas. Strength of the glutei was probably impaired, but without evident atrophy. The right foot showed cavus and slight dorsiflexion of the great toe. The leg measurements were as follows: From the anterior superior spine to the internal malleolus, 25 inches, on each side. Mid thigh; left, $8\frac{3}{4}$ inches; right, 11 inches. Patella; left, $10\frac{1}{8}$ inches; right, $10\frac{1}{8}$ inches. Calf; left, 7 inches; right, $8\frac{1}{2}$ inches. There was also marked weakness of the right thenar muscles. On December 18, an operation was done by Dr. M. H. Rogers for fixation of the tendons of the tibialis anticus and peroneus longus into the tibia and fibula to overcome talipes equinus. There was no disturbance of sensation and except for the physical disabilities noted above, the boy was physically and mentally well.

The evidence in this case points clearly to two distinct attacks of poliomyelitis separated by an interval of three years. In the first attack, the right leg and left arm were chiefly affected, the paralysis of the right leg recovering in great measure, but still showing in some degree at the present time. That this was an actual paralysis at first of a considerable degree of severity is shown, not only by the statement of the mother, who said that the child was obliged to learn to walk over again, taking a year in the process but also more conclusively by the accompanying photograph, which shows the child's shoe worn on the inner side of the forward part of the sole, due necessarily to the dragging of the foot in walking, conclusive evidence of the weakness of the anterior group

of muscles. The second attack, coming on at the age of 6, affected essentially the left leg, rendering it comparatively useless and making necessary an operation for the relief of the deformity. The diagnosis of poliomyelitis cannot be questioned. The onset with fever, followed by a flaccid atrophic paralysis, without sensory involvement and resulting in permanent muscular atrophies, are entirely characteristic and could hardly be due to any other cause. It also does not seem open to dispute that there were in this case two distinct attacks separated by a period of three years of health.



FIG. 1. Shoe worn by patient when recovering from first attack, showing evidence of paralysis of anterior muscles of right leg.

As long ago as 1884, Ballet and Dutil⁷ drew attention to the fact that an attack of poliomyelitis predisposed to certain later cord degenerations. It has been recognized that progressive muscular atrophy may supervene on an antecedent poliomyelitis, but such observations, interesting as they may be, do not concern the present inquiry, since the one point at issue is whether poliomyelitis, now recognized as a definite disease entity, may repeat itself as such.

Certain more significant cases have been reported from time to

⁷ Ballet and Dutil, De quelques accidents spinaux, déterminés par la présence dans la moelle d'un ancien foyer de myélite infantile, *Rev. de méd.*, 1884, IV, 18.

time, the first apparently in 1899. Auerbach⁸ in that year reported a case of infantile paralysis in which an attack in June, 1898, resulted in a paralysis of the left arm and left leg. In August of the same year, a paralysis of the right leg occurred. In this case, the interval between the attacks was only two months and may therefore be regarded as an exacerbation of the original infection rather than an entirely new attack. Conditions of this sort are sufficiently unusual, but as suggested above are of less interest than those in which the interval between the attacks is greater.

Gowers⁹ in the third edition of his textbook alludes to one second attack in a series of 214 cases. The details are not given.

Neurath¹⁰ in 1905 published a case in which three separate attacks or exacerbations appear to have occurred. The patient was a child of five, who suffered a brief loss of power in the extremities following a fever, with recovery at the end of five days. At the end of three weeks, there was a recurrence of the paralysis in the same form and lasting about the same time. Five or six weeks later, a third and more severe attack occurred, with loss of deep reflexes and sensory paralysis. The autopsy showed characteristic cord changes but no differentiation pathologically could be made between the slighter earlier attacks and the final fatal one. Here again, the entire course of the disease, including the three attacks, lasted only about two months, again suggestive of exacerbations of an original infection rather than reinfection.

In the same year Lövegren¹¹ reported two cases; the first with prodromal symptoms of two weeks, followed by paralysis of one leg, followed two weeks later by paralysis of the quadriceps femoris of the other side; and a second case not remarkable except for long continuance of pain. What was said of the previous cases applies also to these.

Sinkler¹² in 1908, in the discussion of a paper by Starr on Epidemic Infantile Paralysis, alludes to a case with two separate attacks. In this case, the right leg was first involved but recovered; at the end of three weeks, the left leg was involved and this paralysis persisted when the patient was examined by Sinkler. In this instance, also, the interval between the attacks was extremely short.

⁸ Auerbach, Ueber gehäufte Auftreten und über die Aetiologie der Poliomyelitis ant. acuta infantum, *Jahrbuch für Kinderheilk.*, 1899, L, 41.

⁹ Gowers, *Diseases of the Nervous System*, third ed., 1903, 409.

¹⁰ Neurath, Beiträge zur Anatomie d. Poliomyelitis ant. acuta, *Arch. aus. d. Neurolog. Inst. Wien*, 1905, XII, 297.

¹¹ Lövegren, Zur Kenntnis d. Poliomyelitis ant. acuta und subacuta chronica, *Jahrbuch für Kinderheilk.*, 1905, LXI, 269.

¹² Sinkler, *Jour. Am. Med. Assoc.*, 1908, LI, 112.

Friedjung,¹³ 1909, describes a boy of two and a half years, who, following a febrile attack of several days' duration, had a paralysis of the left upper arm. Four months later, he developed a paresis of both legs, with later pseudohypertrophy of the calves. With this second attack there was, however, no fever, and the pseudohypertrophic affection of the calf muscles might well lead to some doubt of the diagnosis.

Sheppard,¹⁴ in the Massachusetts State Board of Health publication on Infantile Paralysis for 1910, reports the following case: In a family living in a rural part of Massachusetts, a girl at that time three years of age—now sixteen years ago—underwent an attack of poliomyelitis with ultimate paralysis of the left deltoid. This patient, when nineteen years old, was again “taken sick and within a week developed a distinct Landry's paralysis, involving all four extremities, neck, back, abdomen, and respiration.” Sheppard assumes that the Landry's paralysis was a poliomyelitis and that the infection was the same in the two attacks. This history is further interesting from the fact that various other members of the family had infections resulting in paralysis, several of whom died, one, a girl of nearly seventeen, with the Landry type of poliomyelitis. In this instance, if we admit, as seems probable, that the Landry's paralysis was a poliomyelitis, the conclusion appears justified that the patient suffered from two distinct attacks of the disease at an interval of sixteen years. It is to be regretted that this case, and in fact the history of the entire family, is not detailed at greater length.

In the same Report of the Massachusetts State Board of Health, a case is briefly reported by T. P. Hennelly¹⁵ which occurred in the epidemic at Fall River, Mass., in 1910. The patient was a child of two and a half, who was paralyzed in the right leg early in May, from which she recovered in about a month. On June 28 of the same year, following an acute febrile and gastrointestinal attack, tenderness of the legs and inability to walk developed. A month later, the child was able to stand but still had toe drop and double flat foot. The interval between attacks here was short and the case is not reported in detail.

In 1910, Eshner¹⁶ reported a somewhat doubtful case, which

¹³ Friedjung, *Zur Kenntnis d. Poliomyelitis ant. acuta*, Wien. med. Woch., 1909, LIX, 2311.

¹⁴ Sheppard, *Infantile Paralysis in Massachusetts during 1910*, Mass. State Board of Health, p. 134.

¹⁵ Hennelly, *idem*, p. 37.

¹⁶ Eshner, *A Possible Second Attack of Acute Anterior Poliomyelitis in the Same Patient*, Med. Record, 1910, II, 527.

however is significant as pointing to a definite second attack rather than an exacerbation of the original infection. A child of twenty-six months had an attack of poliomyelitis involving the right leg, with practical recovery. Eleven years later, after a fall, weakness in both hands developed but without fever, vomiting, or definite signs of infection. Recovery of the right hand took place but that of the left was incomplete.

Osgood and Lucas,¹⁷ in 1911, published certain experiments which proved that the virus of the disease may persist in a viable and infectious state in the nasopharyngeal mucous membrane of the monkey, for several months after the onset of acute paralysis, and for a much longer time than it survives in the central nervous system. These writers make note of the practically important fact that transmission from monkey to monkey only occurred through direct inoculation in spite of the fact that an attempt was made to transmit the disease by contact and the use of common feeding utensils and material. The significance of these observations has been widely recognized, but the artificial character of the transmission of the disease must be borne in mind in dealing with the human problem, as the writers suggest.

Eckert,¹⁸ 1911, in the description of a small epidemic occurring in Berlin, refers briefly to an observation from Heubner's clinic of a child, sick with poliomyelitis in 1903, with resultant paralysis of the left leg, requiring tenotomy. In April, 1909, a second attack occurred, with paralysis of the right leg.

In the same year, Oulmont and Baudouin¹⁹ reported an interesting, but probably not altogether relevant case, of a man of 60, who, following a fall, sustained contusions and a luxation of the left knee. After a month in bed, he developed in two days weakness of the legs and arms, becoming a practically complete paralysis, flaccid in type. At this time, he had a very active thirst, passing ten liters of urine daily. He improved rapidly, and was able to walk at the end of a month and a half. He returned to work practically well, except for some general weakness. At the end of about a year, he had a recurrence of the same symptoms, with polyuria and polydipsia, and the appearance of some sugar and albumin in the urine. Muscular paralysis developed as before. He became

¹⁷ Osgood and Lucas, Transmission Experiments with the Virus of Poliomyelitis, Jour. Am. Med. Assoc., 1911, LVI, 495.

¹⁸ Eckert, Ueber das akute Stadium der epidemischen Kinderlähmung, nebst Bekanntgabe eines Falles von Poliomyelitis fulminans, Deut. med. Woch., 1911, XXXVII, 113.

¹⁹ Oulmont and Baudouin, Poliomyélite antérieure à rechute: rôle possible d'un traumatisme antérieur, Rev. Neurolog., 1911, March 30, p. 333.

incontinent and delirious, and died two weeks later. The autopsy showed changes in the central nervous system, not limited to the ventral horns. Cell degenerations, without inflammation, were apparent, together with certain changes in the muscles. The comprehensive diagnosis was made of Landry's paralysis, poliomyelitis, subacute or chronic myasthenia, polioencephalomyelitis. The writers discuss at some length the effect of trauma in the etiology of this widespread disturbance. It seems hardly justifiable to consider this case with its various complications as a recurrent poliomyelitis, but this possibility is entertained by the authors. The question of a generalized neuritis, possibly on a diabetic basis, would seem to be a more reasonable hypothesis.

In 1913, Lucas and Osgood,²⁰ after referring to the observation of Klung, Pettersson and Wernstedt that the virus might be recovered from nasopharyngeal swabbings and washings as long as seven months after infection, report a case which they assume to be a carrier, in which the virus persisted, presumably for two years and three months. A child of five had an attack of paralysis in February, 1910; when seen two years later he showed a paralysis of the dorsal flexors of both feet, and of the peroneal group on the right. He continued to improve till September, 1912, when following an attack of what appeared to be bronchitis and coryza, he suddenly became weak in the right arm with increased weakness also of the affected leg. This attack was associated with fever. The child gradually recovered. Two weeks after this second attack, the child's sister had fever and one of her arms was thereafter completely paralyzed, with accompanying weakness of the legs. The boy improved and the paralysis of the arm recovered. The nasal secretion secured some months later injected intracerebrally into a monkey led to its paralysis and death. Appearances in the cord suggested poliomyelitis. A later experiment of a similar sort led to appearances in paralyzed monkeys typical of poliomyelitis. The writers speak of this case as of special interest, as "demonstrating the long period during which the virus was undoubtedly harbored in the nasopharynx," and also as indicating the probable infection of his sister two years after his primary attack. It is also noteworthy that the recovery of active virus from the nasal secretion was possible four months after the second attack and two years and three months after the first. The assumption is made by the writers that the child harbored the virus during this long period

²⁰ Lucas and Osgood, Transmission Experiments with the Virus of Poliomyelitis, *Jour. Am. Med. Assoc.*, 1913, LX, 1611.

of time. No consideration is given to the possibility of a distinct separate attack and that the sister may have derived her infection from a common source quite independent of the brother. This evidently involves the important question at issue, namely, whether we are justified in assuming the persistence of the virus with the possibility of an exacerbation after a long period of time rather than the incidence of an entirely new infection.

Finally, in 1915, Sanz²¹ describes the case of a woman of thirty-five, who, at the age of one year, had a paralytic attack involving the left leg and foot. At the age of fifteen, a second attack led to a similar paralysis of the right leg and foot. In both instances, the onset was associated with signs of infection. At the time of writing, the paralysis had persisted, the knee jerks and plantar reflexes were lost, sensation was normal. The feet were cyanotic and in a position of equino-varus. The evidence in this case is distinctly of two attacks of the disease, separated by a period of 14 years.

From the foregoing survey of the published cases, which it has been possible to collect, it appears that in those reported by Auerbach, Neurath, Lövegren, Sinkler, Friedjung, and Hennelly, the so-called second attack occurred in no instance more than four months after the first. This interval of time is certainly too short upon which to base a theory of an actual second attack rather than an exacerbation or a relapse of the original infection. It is, however, worthy of note that such relapses should occur, and it certainly cannot be definitely asserted that even these are not reinfections. Of the remaining cases, the second attack occurred at the following intervals: Sheppard, sixteen years; Eshner, a somewhat doubtful case inasmuch as the second attack occurred after a fall and without evidence of infection, eleven years; Eckert, six years; Lucas and Osgood, two years and three months; Oulmont and Baudouin, one year (a doubtful case); Sanz, fourteen years; and the case here reported, three years. Lucas and Osgood assume that their patient was a carrier and harbored the virus which again assumed activity, leading to a fresh paralysis, at the end of two years and three months. This, as before stated, is an assumption which the facts do not necessarily justify. It cannot be disproved that an actual second infection occurred. This would seem even more probable in the cases of six, fourteen, and sixteen years respectively, reported by Eckert, Sanz, and Sheppard. This applies also to the

²¹ Sanz, Un caso de parálisis espinal infantil recidivada, *El Signo medico*, 1915, LXII, 530. (Abs. Rev. Neurol. and Psych., 1915, XIII, 544.)

case reported in this paper. It is hard to imagine conditions which would permit a virus to remain dormant for these long periods of time, and then suddenly so to increase in virulence that a second paralytic attack is induced nor does there seem to be an analogy for this in other infectious diseases. A more rational hypothesis, but one which as yet is incapable of experimental proof, is that the first attack in rare cases does not lead to such an immunity that a second and entirely independent attack is impossible. It is at least desirable that all cases in which a second attack is definitely determined should be placed on record.

In general it may be concluded that an attack of poliomyelitis in the great majority of cases confers a lasting immunity; that it is definitely established that exacerbations or relapses may occur at short intervals of time after the primary onset; and finally, that evidence is accumulating to show that an actual second attack with re-infection from an external source may and probably does occur in rare instances.²²

²² Since this proof was sent to press Dr. Simon Flexner has made the following dogmatic statement regarding the immunity provided by one attack of the disease.

"Infantile paralysis is one of the infectious diseases in which insusceptibility is conferred by one attack. The evidence derived from experiments on monkeys is conclusive in showing that an infection which ends in recovery gives protection from a subsequent inoculation. Observations on human beings have brought out the same fact, which appears to be generally true, and to include all the forms of infantile paralysis, namely, the paralytic, meningeal or abortive, which all confer immunity." *Jour. Am. Med. Soc.* 1916, LXVII, 281.

THE CLINICAL VALUE OF DEFENSE AND MUSCLE REFLEXES. IMPORTANCE OF THE LATTER IN SPINAL LOCALIZATION*

BY DR. T. H. WEISENBURG

PHILADELPHIA, PA.

According to Babinski¹ the so-called defense reflexes were first observed as long ago as 1784 by Prochaska who described the quick movements of the legs produced by tickling the foot of a frog in which the cord had been severed. Later the same phenomenon was described by others while in recent years Marie and Foix² in view of Sherrington's experience proposed the term "reflexes of medullary automatism" as more appropriate than defense reflexes. The so-called dorsal plantar reflexes of Bechterew according to Babinski represent the same phenomenon. These observations were lost sight of by clinicians after the discovery of the tendon reflexes and it is due to Babinski that they have again been discussed. As described by him in, for example, a case of complete paralysis of the legs from compression of the cord one usually observes the following type of defense reflex: "There is a series of flexion movements of the various segments of the lower extremity, the foot is raised, and flexed on the leg, the leg on the thigh and the thigh on the trunk; sometimes adduction of the thighs is added to the other movements. While this is the most frequent type, there are many variations. Thus there is an extensor type in which all of these parts are extended, or there may be combinations. Usually in abnormal states these reflex movements are slow, but there are exceptions; for instance, in Friedreich's ataxia they are very rapid and much exaggerated. There is also great variation in the amplitude of the movements. Sometimes the slightest touch of the extremity may produce a whole series of flexor movements, while in other cases severe pinching may cause only a flexion of the foot."

Similar defense movements according to Babinski are seen in the upper extremities and show the same variations in character and

* Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

¹ Babinski, *Rev. Neurol.*, March, 1915, p. 145.

² Marie and Foix, *Les reflexes d'automatisme medullaire*, *Rev. Neurol.*, 1912, vol. XXIII, p. 657; and *Semaine Médicale*, October 22, 1913, p. 505.

intensity, but more frequently than those of the legs they are confined to one side. Even the muscles of the trunk may participate, as may those of the intestinal walls and bladder as evidenced by expulsion of gas or involuntary micturition.

In 1899 Babinski³ described a form of spastic paraplegia due to an organic lesion but without degeneration of the pyramidal tract. The chief characteristic of this form of spastic paraplegia was a contracture of the limbs in flexion, the tendon reflexes being usually not exaggerated and often diminished while the cutaneous reflexes on the other hand were so markedly increased that irritation of the skin on the paralyzed side would cause defensive movements of rapid withdrawal of the limb in flexion. In 1911,⁴ he again called attention to this type of spastic paraplegia as contrasted with the usual type of paraplegia with contracture of the limbs in extension and continuous exaggeration of the tendon reflexes. Babinski designated the flexion type as a cutaneo reflex contracture and the usual extensor type as tendino reflex contracture. In discussing the flexor contracture he further made the statement that this occurs only when anesthesia of the limbs has not developed or is slight and the pyramidal tracts are not degenerated or are only slightly degenerated. According to Babinski then a gradual pressure upon the cord such as is produced by a pachymeningitis, extradural tumor, Pott's disease or in those diseases in which the axis cylinders in the pyramidal tract largely escape as in Friedreich's ataxia and multiple sclerosis, there should be not only a flexor contracture but a marked presence of defense reflexes.

In his latest paper Babinski⁵ has come to the conclusion that the pathological reflexes are an exaggeration of the normal physiological responses and that an increased amplitude of movement is present in the pathological state and that it may be obtained by pinching the lower extremities outside the sole of the foot as on the dorsum of the foot or on the leg, for pinching in these localities never produces the reflexes in the normal state. The clinical significance of the pathological defense reflexes is of a pyramidal lesion and it has the same meaning as the extensor sign of the big toe and increased tendon reflexes. He finds that it is not at all unusual to obtain plantar flexion of the big toe along with other flexor movements in stroking the dorsum of the foot while stroking the sole of the foot produces a typical extension of the big toe. The intensity

³ Babinski, *Bull. et Mem. Soc. Méd. d. Hôp. de Paris*, 1899, p. 342.

⁴ *Idem*, *Rev. neurol.*, January 2, 1911.

⁵ *Idem*, *Rev. neurol.*, March, 1915, p. 145.

of the defense reflex is not always proportionate with that of the tendon reflexes. He finally makes the statement:

The condition of the defense reflexes may be of value in locating a lesion compressing the cord, as they are exaggerated in the whole cutaneous territory connected with the cord below the point of compression. Observations on the relationship between the area of anesthesia and the area of increased defense reflexes have led Babinski to formulate the following rule: When, in a case of compression of the cord, a variation between the two areas is considerable, we are probably dealing with an extradural tumor or pachymeningitis, *i. e.*, lesions extending for a considerable distance. On the other hand, when the areas of anesthesia and of increased defense reflexes coincide the lesion is probably an intradural tumor, one usually extending only a short distance. Babinski has had occasion to verify the value of the defense reflexes in spinal localization in sixteen cases, namely, two of stab wound of the cord with Brown-Séquard syndrome; one of pachymeningitis cervicalis hypertrophica; the rest tumors, three of which were extradural.

To determine the value of the defense reflexes with Dr. Fred. B. Clark, I investigated different types of cases in the nervous wards of the Philadelphia General Hospital. In this were included cases of multiple sclerosis, all forms of myelitis due to different causes, various focal lesions of the spinal cord, cases of hemiplegia, diplegia and pseudo-bulbar palsy.

In four cases of multiple sclerosis in which Babinski states that the defense reflex is quite prominent we found in only one a flexor type of contracture. In the other three the legs were in the extensor position. The defense reflexes were prominent in two of these cases but it is interesting that they were most pronounced not in the patient in whom there was a flexor contracture but in one in whom the limbs were in extension. It is also interesting to note that in the most marked case of multiple sclerosis there were no defensive movements at all.

In a case of pressure myelitis involving the ninth and tenth thoracic segments the defensive movements were not at all prominent, although the muscle reflexes up to the lower limit of the lesion were very marked. This patient, who was studied for a period of over three months, had a gradual increasing weakness and loss of sensation of both lower limbs, beginning first with the feet and extending upwards, involving the abdomen to about the region of the umbilicus.

More than thirty cases of myelitis were studied. Most of these

were due to syphilis. They were in the hospital various lengths of time, one for twenty-seven years. Most of these cases had the extensor type of contracture. In only two were the defensive reflexes prominent although in all the spasticity was great and the tendon reflexes very prompt.

Two cases of Pott's disease were examined. In one a permanent flexor contracture was present but the defensive reflexes were not prominent in either although in the flexor case the flexion movement of the legs was greater.

In a case of spondylose rhizomelique in which there was an extensor contracture with marked increased reflexes and Babinski phenomenon, no defensive reflexes were obtained.

In a case of acute meningitis with lost tendon reflexes but prompt Babinski response, the defensive movements were marked.

In the hemiplegics examined the contractures of course were of the extensor type. In these no prominent defensive responses were obtained. Two cases of diplegia were discovered in which there was contracture in flexion but in both it was found on closer examination that the spinal cord was implicated due to a specific involvement. In these defensive responses were prominent.

Conclusion.—From the investigation we made including all types of spinal cord and brain lesions but in all of which there was pyramidal involvement, we cannot say that the presence or absence of the pathological reflexes of defense had any distinct diagnostic value. We could not come to the conclusion that the pathological defensive reflexes indicated an irritation or compression of the cord. In some spinal cord cases, especially in those in which there was flexor contracture, the defensive movements were quite marked but on the other hand when they were obtained they were at times equally marked in the extensor types of paraplegia. We gained the impression that the more severe the stimulation the greater the defensive movements. For example it was a common experience when irritating the soles of the feet or the legs that at first no defense movement would be obtained but repeated stimulation would after a while cause prompt defensive movements. Occasionally pin irritation produced defensive movements where pressure and pinching would not.

There are undoubtedly exceptional cases of spinal cord disease such as Babinski has described in which there is great increase of tonicity with exaggerated tendon reflexes and with at times permanent extension of the large toe in which defensive movements can be obtained by stimulation of the skin up to the area correspond-

ing to the lower limit of the lesion, but these cases are necessarily rare, and we must finally conclude that in the usual run of spinal cord cases the pathological reflexes of defense are not of distinct diagnostic importance.

The pathological reflexes of defense must not be distinguished as distinct from the dorsal extension of the large toe. Dejerine and Mouzon,⁶ for example, in reporting various types of spinal cord lesions following war injuries designated the defensive reflexes as contractions of the tensor fascia lata, adductors and the sartorius, but not including the dorsal flexion of the large toe. This was not our experience, for it was impressed upon us that in no case did we obtain a dorsal movement of the large toe without a simultaneous movement of some of the muscles of the thigh.

MUSCLE REFLEXES

The most productive part, however, of our investigation concerned the muscle reflexes. By a muscle reflex is meant the response of either the whole or part of a muscle when tapping the body of the muscle itself. This of course is present in a normal individual but the response is not marked. In every instance in which the motor columns are diseased the muscle jerks are very prominent. For example, in hemiplegia the muscle jerks are increased upon both sides, but they are distinctly more so on the hemiplegic side. In all cases of myelitis with the exception of those instances in which there is complete destruction of the cord, the muscle jerks are always exaggerated up to the upper limit of the lesion. In the peripheral segments corresponding to a destructive process in the cord the muscle reflexes are either diminished or absent. In cases of tabes the muscle jerks are diminished, while in poliomyelitis they are absent in the diseased areas. The intensity of the responses depends upon the hypertonicity of the muscles. The greater the hypertonicity the more marked the response.

Of course muscle irritability is increased in functional diseases such as hysteria or neurasthenia or in diseases such as tetanus, but in such instances the important point is that the muscle jerks are prominent in all parts of the body.

For diagnostic purposes then the value of the muscle reflexes consists either in their diminution or absence in limited areas or in their increase in limited areas.

To quote cases: In a patient with a myelitis following a large number of serum injections for rabies there was complete absence

⁶ Dejerine and Mouzon, *Rev. neurol.*, March, 1915, p. 155.

of muscle jerks in the muscles of the upper chest corresponding to the distribution of the first to the sixth thoracic segments inclusive. Above this region the muscle jerks were prompt, while below this area over both legs and abdomen and lower chest they were prompter than normal but not as prompt as they were above the upper limit of the lesion. The sensory disturbances extended to the upper limit of the loss of muscle reflexes. As this patient improved the muscle jerks gradually returned until they are now present over the entire chest but not as prompt as either above or below the lesion. In other words the absence of the muscle jerks indicated the area of complete destruction and later on of interruption of certain segments of the spinal cord.

Another such case was seen with Dr. John Luther in Palmerton, two days after a crush injury of the upper thoracic region. This patient was completely paralyzed in both legs with loss of bladder and rectal control and loss of sensation to a line corresponding to two inches above the umbilicus. From this point to a line parallel with the first rib sensation especially to pin prick was partially appreciated. The muscle jerks were prompt in the upper limbs and over the neck and shoulders but over the entire chest the muscle reflexes were either not obtained or very slightly, the absence or diminution of the muscle jerks corresponding with the impaired area of sensation, while over the buttocks and lower limbs the muscle jerks were prompt. This is especially interesting in consideration of the fact that the epigastric and cremasteric skin reflexes and the knee and tendon jerks were totally absent. Plantar irritation on the right side where the lesion was greatest at the first stimulation produced an extension of the large toe with some movement of the thigh muscles but this was easily exhausted, while stimulation on the left gave a more prompt reaction. In this case the limits of the lesion were diagnosticated by the diminution or absence of the muscle reflexes while the presence of the muscle jerks below showed that the corresponding segments of the spinal cord were normal.

In another case which has been previously reported by Dr. Spiller of a patient with myelitis in whom in 1909 Dr. Frazier cut the posterior roots of the second, third and fifth lumbar and the first, second and third sacral segments, for the relief of spasticity, the muscle jerks were either absent or diminished in the parts in which the reflex arcs were interfered with, while in the adjacent parts they were prompt, as they were over both lower limbs, chest and abdomen. In other words the muscle jerks were diminished or absent wherever their arcs were interfered with.

In a case of pressure myelitis of the ninth and tenth thoracic segments which was exhibited by me before the Philadelphia Neurological Society, there was gradually increasing weakness of the lower limbs, first of the feet, then the legs, thighs and finally lower abdomen. The tendon and muscle reflexes were very prompt throughout but it was noticeable that as the weakness gradually extended upward the muscle jerks in the corresponding parts became equally prompt. For example, when that part of the cord corresponding to the lower abdomen was implicated, tapping over any part of the lower abdomen up to the lower limit of the lesion caused prompt contraction of the abdominal muscles.

In another case of complete destruction of the lumbo-sacral cord due to fracture dislocation of the vertebrae there was paralysis of both legs and loss of all tendon and skin reflexes. No muscle jerks were obtained at all. This argued that the entire lumbo-sacral cord was destroyed for in cases of limited transverse myelitis the muscle jerks are present below the lower limit of the lesion.

CONCLUSION

1. Exaggerated muscle reflexes are constantly present in pyramidal lesions and are of equal importance with increased tonicity and increased tendon reflexes.

2. In spinal localization they are of value, for in destructive lesions they are either absent or diminished in the peripheral area corresponding to the lesion. In such cases the muscle jerks may be increased just above the lesion but are always exaggerated in the parts of the body below the lower limit of the lesion, even though the skin and tendon reflexes are diminished or lost.

3. In incomplete lesions of the spinal cord the muscle reflexes are exaggerated up to the upper limit of the lesion.

4. In a gradually extending upward paralysis such as is produced by a pressure myelitis the exaggeration of the muscle reflexes keeps pace with the increase of the paralysis and is an indication of an extension of the lesion.

5. Finally the most important conclusion that can be drawn is that the exaggeration and more especially the absence of a muscle reflex is an indication of the state of the reflex arc in the spinal segment corresponding to that particular muscle.

FAMILY SPASTIC PARALYSIS¹

BY JOHN H. W. RHEIN, M.D.

PROFESSOR OF DISEASES OF THE MIND AND NERVOUS SYSTEM AT THE PHILADELPHIA
POLYCLINIC AND COLLEGE FOR GRADUATES IN MEDICINE; NEUROLOGIST
TO THE HOWARD HOSPITAL

(Continued from page 144)

VII

Tremor of the legs and arms occurred in a number of cases, namely: Bouchard, Newmark, Wirschubski, Pesker, Levy, Ballet and Rose, Dreschfeldt, Giese (88), Ganghofner, and Pauly and Bonne.

Torticollis was present in one of the cases, that of Cestan and Guillain. They reported a case of a boy of fifteen, who developed at an early age heaviness in the legs and tendency to walk on the toes. The arms became involved at the twelfth year. There was a torticollis which turned the head to the right. The gait was spastic with no ataxia nor intention tremor of the legs. Patellar and Achilles reflexes were exaggerated. No trophic, sensory, nor sphincter troubles. Arm reflexes exaggerated. Slight hyper-tonicity of the muscles. A father and aunt of the patient were similarly affected.

Cramer reported an observation in a woman of forty-two, whose sister became similarly affected at her sixth year. At the age of ten, the patient noted a trembling of the hands which progressed rapidly at the age of twenty, and at this time there developed stiffness of the legs. There was intention tremor of the arms and tremor of the head when she was spoken to. Speech was slow and trembling as in Friedreich's disease. Her equilibrium was uncertain, but this was not increased by closing the eyes. The knee jerks and Achilles jerks were exaggerated. There was distinct mental deterioration.

Her sister, aged twenty-eight, had been spastic in her legs since sixteen years of age. She exhibited also intention tremor in the arms, trembling speech, tremor of the head, contracture of the sternocleidomastoid muscle. Her equilibrium was also uncertain

¹ Read before the Philadelphia Pediatric Society, October 13, 1914.

but was not affected by closing the eyes. The knee jerks were exaggerated.

Geise described two cases in the same family, aged thirty-three and twenty-five years, with negative family history. Both patients were weak-minded from early youth. There were progressive feeble-mindedness, slow monotonous speech, irregular tremor of the hands, and of some of the face muscles increased by effort, but also passively present, uncertain swaying gait, exaggerated reflexes and general muscular rigidity. The symptoms began at sixteen years of age in both subjects. There were no sensory disturbances. The man suffered from epilepsy since nineteen years of age.

Lorrain described a case in a girl of eighteen exhibiting spastic paraplegia, increased patellar reflexes, foot clonus and intention tremor of the hands without Romberg sign or ataxia, sensory or sphincter troubles. There was nystagmus and a slight impairment of vision. Father was alcoholic and a degenerate and a maternal aunt died insane. The patient had incipient meningitis at eighteen months with convulsions. The disease began between the eighth and ninth year of age. Case two, the second patient, a brother, aged twelve, born at term as was his sister, complained of pains in his legs, as did his sister, and of tiring readily in walking. There was a tremor in the right leg and tendency to genu valgus; slightly increased patellar reflexes but no sensory nor sphincter disturbances nor nystagmus. The symptoms began a year previously, at eleven years of age. The third patient, a sister of ten, began dragging the legs at nine years of age. Reflexes not exaggerated and no other disturbances.

Kojevnikoff (89) reported the case of a girl of seventeen, normal birth, who began at seven years of age with difficulty in walking, could not walk at nine years, when the arms began to be stiff and rigid. Speech troubles set in at fourteen. Kyphosis, knees were flexed and feet in equinovarus position, exaggerated reflexes, arms were held in extension and abduction, wrists and fingers flexed and muscular force low. No sensory nor ocular troubles. Deglutition normal. Tremor of the arms developed on effort. Second case, aged nine, normal birth, onset and development as in sister. Spastic gait, arms not involved, no psychic nor sensory troubles.

Trenel reported two sisters, aged fifty-two and fifty, daughters of consanguineous parents. A maternal uncle and grandmother were insane. One of the patients had convulsive attacks at the onset of the menstrual period, followed by mental troubles. The second sister had convulsions during infancy and menstrual delirium

with reduction of the mental capacity. Spasticity began at twenty years, which affected not only the legs but the arms. In the older patient, in the last three years there developed epileptiform attacks, followed by fibrillary tremor of the right side of the head with volitional tremor of the hands. Tendon reflexes increased in the first case, and slight speech disturbance in one case. No pupillary disturbance.

Batten and Wilkinson reported two boys, aged four and two, who had two uncles with the same complaint. One uncle died in convulsions, and another uncle died with brain abscess. The two boys described were born at term without accident, and were never able to walk. Symptoms consisted of tremor of the head and arms, nystagmus, ataxic legs, hypertonia of the legs and arms and defective speech. Mentality defective. Ankle and knee reflexes present. No trouble swallowing. The two uncles, aged twenty-four and seventeen, respectively, developed symptoms in infancy, the symptoms being similar to those described in the nephews, except that the knee jerks were pronounced, and ankle clonus was present.

Jendr ssik reported a family in which there were five cases of muscular contractions of the lower extremities, tremor of the arms, nystagmus, and increased reflexes. The family consisted of a male of thirty-six, a female of twenty-five, and a male of twenty-one, and a girl of eighteen, and a niece of six. Family history was negative. The disease appeared at twelve years of age in one, ten years of age in the second and about the sixth year of age in the other two. He cited a third family, a woman of twenty-nine and a brother of fourteen, who suffered from muscular contractions, high-grade kyphoscoliosis and pseudo-nystagmus. The family history was negative, except that the mother had a slight ptosis of the right eye and one son had ptosis. He described a fourth family in which two brothers, aged eighteen and eight respectively, showed pronounced deformity of the feet, kyphoscoliosis, muscular contractions, tremor, disturbances of speech and vision. The parents were first cousins. The oldest was unable to walk, developing his first symptoms at eight years of age. Speech disturbances appeared at his fourteenth year. The patellar reflexes were exaggerated and there was foot clonus and positive Babinski. There were no sensory disturbances. The boy of eight, as his brother, was born at term perfectly normal, and remained so until six years old. Both legs were held in extension and both feet in varus position. The gait was spastic, the patellar reflexes were exaggerated, there were positive Babinski and

foot clonus, and the power of vision was diminished in both. Jendrassik reported a fifth family in which two sisters, aged ten and eleven, were afflicted. The paternal grandparents were first cousins and the two grandmothers were cousins. They presented external ophthalmoplegia, dystrophia, uncertainty of intention movements and absence of patellar reflexes. The children were born at term and developed normally. One was unable to walk after she had typhoid fever. Her speech was nasal, her feet typical Friedreich's feet and there was a positive Babinski.

VIII

Some of the cases present symptoms in the nature of a disseminated sclerosis.

Cramer reported a family which exhibited the form of spastic paraplegia of the multiple sclerosis type. While in the first patient the onset was that of simple spasticity of the legs, in the second there was early involvement of the arms with incoördination and marked dysarthria.

Dobrochotow reported eleven cases in two generations illustrating an hereditary family disease, being a transitional type between spastic spinal paralysis and Friedreich's disease. The affection appeared between the eighth and tenth years and progressed gradually for four to seven years and at ten remained stationary. The symptoms consisted of typical spastic paraplegia gait with rigidity of the legs, ankle clonus, Babinski sign, nystagmus, scanning speech and disturbances of swallowing. Sensory disturbances, ataxia, tremor and paralysis of the arms were absent. Five of the patients were male and six female. The father of the first generation, from whom the hereditary taint can be traced, presented indication of incipient tabes at thirty-three years of age. The hereditary taint was mixed, affecting both the male and female members, and the youngest generation was still below the critical age of the eighth year, so that it was impossible to tell whether the taint had descended from healthy members of the family. None of the descendants appeared to be perfectly healthy, as the nystagmus was present in all of them, and three males and one female showed very active reflexes and another a peculiar intonation disturbance. Dobrochotow claims that this family disproves the theory of Newmark that the taint does not depend upon a latent hereditary and transmissible pathological peculiarity in one or the other apparently healthy parent; but that it is the result of conflicting germs from both parents. These cases are difficult to place, as the disease resembles multiple sclerosis if

the hereditary family character is excluded. Dobrochotow acknowledges that this disease has not been included in the hereditary nervous affections.

Eichorst cited two cases of disseminated sclerosis in a mother and son, the symptoms of which consisted of intention tremor of the hands, nystagmus, scanning speech, active patellar reflexes, paralysis of the oculomotor nerves, optic atrophy, lowered mentality and contractures of the hip and knee joints. The autopsy findings showed sclerotic plaques in the antero-lateral tracts of the spinal cord, which was normal elsewhere.

Weisenburg (90) described two cases of multiple sclerosis in brother and sister. He referred to another member of the same family similarly affected. First case, a man of thirty-four, with normal birth and development, began at the age of fifteen to have a stooping posture and then weakness of the knees. The gait was at first staggering but then developed into an ataxic gait and in nine years he was unable to walk. There was a jerky movement of the eyes when looking forward and upward. The arms were normal. The legs were thin and undeveloped without localized atrophy, and were very spastic. There were bilateral patellar and ankle clonus and positive Babinski. Second case, a woman of thirty-nine, had St. Vitus' dance at four years of age, and had been bedridden since five years of age. There were a general tremor of the entire body, typical scanning speech and difficulty in swallowing. There was some nystagmus but no ocular palsy. There were no local atrophies but the arms and legs were poorly developed. The feet were contracted in a dropped position with the toes turning inward and the legs were highly spastic.

Pelizaecus described a family consisting of a son, three grandsons and a great-grandson all afflicted with the same disease. The symptoms began in the early months of life in all cases and consisted of double nystagmus, speech disturbances, spastic paralysis of the legs and to a less degree of the arms, of the muscles of the back and face, with increased tendon reflexes and slight mental deterioration, but without sensory disturbances or atrophy. The symptoms resembled multiple sclerosis.

Merzbacher described a disease of the nervous system occurring in four generations, beginning in the early months of life, the symptoms of which led to the diagnosis of multiple sclerosis. This was the same family as that reported by Pelizaecus. In one case there was an absence of myelin fibers and axiscylinders from the inner part of the cortex to the spinal cord. The number of cases that had developed in the family had increased to twelve.

Santo de Sanctis and Lucangeli described a hereditary syphilitic form of infantile multiple sclerosis. There were three children in the family, two boys and a girl, in which there was slight insufficiency of the facial nerve. The deep reflexes were weak and not readily obtained, although in one case they had been quick and rapid. There were torpid motility and hypertonia of the lower extremities, strabismus and nystagmus, intention tremor, defective gait, ataxic speech in two and irregular vacillating in one, scanning speech and bradylalia, and Romberg sign in two of the cases. The children were born at term and developed normally. The father was a syphilitic and the mother had had two miscarriages. The optic neuritis is of the utmost diagnostic value in differentiating between this type and the other type. He stated that there exists a sclerotic type of cerebrospinal hereditary syphilis and this occurs frequently in infancy and should not be confused with the true type.

Reynolds reported a family exhibiting symptoms of disseminated sclerosis. The first patient, a man of thirty, developed the symptoms a few months previous to coming under observation. His gait was uncertain and spastic, the knee jerks were increased and there was bilateral ankle clonus. He wrote with difficulty and his speech was slurring. There was no nystagmus, paralysis of the eye muscles nor optic atrophy. When provoked he was moved to sudden laughter and his equilibrium became so disturbed he would fall to the ground if not supported. The second child, thirty-seven years old, began to have numbness of the thighs four years previously. Three years later the numbness affected the hands and there was a slight slurring and slow speech. The writing was uncertain, infantile, and scrawly and the right thenar muscles were slightly atrophic. The sixth child of the family, now thirty years old, three years previously felt his left leg suddenly give way. There were numbness of the fingers and blurred vision. There was no nystagmus but the speech was slow. The father of the first patient developed melancholia. A first cousin died of disseminated sclerosis. A maternal aunt had melancholia and one of the children also died from melancholia.

He reported a second family in which two sisters were afflicted with the same symptoms. The first case, a woman of twenty-five years of age, five years previously had double vision for a few months and a year later she became unsteady in her gait and the legs suddenly gave away beneath her. The gait was slightly spastic. There was some uncertainty in the use of the hands. The knee jerks were increased but there was no ankle clonus. There was

some occasional numbness but no definite disturbances of sensation. The speech was thick and slurring. There was no nystagmus and the optic discs were normal. Another sister, aged twenty-nine, presented similar symptoms.

Pesker reported two cases in brothers. A paternal uncle had convulsions followed by paralysis of the legs and another uncle had a similar history but the arms were also affected. One of the patients born at term without accidents of labor, had convulsions at fifteen days of age. At two years of age the convulsions reappeared and continued. He began to talk at two years of age, the speech being difficult and slow. The patient, aged twenty-four, showed little muscle in the upper arms, although the upper arms were well formed, and they were the seat of athetosis. The legs were wasted and in a cross leg position, the feet turned outwards. The patellar reflexes were normal. He was never able to walk and had always soiled himself. The autopsy showed general arrest of the development of the fiber system of the spinal cord with almost complete obliteration of the fibers of the direct cerebellar tracts. The fibers in the posterior columns were sparse, but the triangle at the margin of the horns and the small median fibers in Goll's tracts were well preserved. The crossed and pyramidal tracts were least affected. Clarke's cells had almost entirely disappeared. The cells of the anterior horns were well preserved. There were no signs of sclerosis. The sparseness of the fibers was also observed in the medulla oblongata, pons and peduncles and there was an attenuation of the fibers in the cortex, where the fibers were less numerous. The large pyramidal cells were present, especially in the rolandic area, but the bodies, and particularly their nuclei, were less visible. There was a notable diminution of the fibers of the cerebellum and only a few Purkinje cells were present. Anatomically there was a pronounced hyperplasia of the entire cerebrospinal axis. The case had a similarity to those published by Pelizaeus.

The second case, aged eighteen, had a similar history of convulsions at fifteen days of age, which recurred until one year old, when they ceased. The boy talked at one year of age, although the speech was slow and difficult. He was unable to walk and an intention tremor involved the entire body. There was no sensory disturbance. There were slight nystagmus and a slight lesion of the fundus. The patellar reflexes were much exaggerated on both sides. There was no foot clonus.

Freud described two children whose parents were uncle and niece. One child of the same generation was paralyzed and appar-

ently idiotic at birth. First case born at term with easy and normal labor, but was abnormal at birth. Pupils never reacted to light and nystagmus appeared at three months. Could creep and sit up at eighteen months and talked at one year but was never able to walk. Examination showed horizontal nystagmus and bilateral optic atrophy. There were slight intention tremor of the arms with spastic diplegia with patellar reflexes exaggerated and double clonus, spastic gait when supported, bradylalia and normal intelligence. Second child presented the same symptoms but less marked. The first symptoms were first noted at seven months of age and nystagmus appeared at the second year. Speech developed at one year, primary normal but became affected later.

Abrahamson reported a girl of seventeen and her brother of sixteen years of age, with multiple sclerosis. Parents were well and children born at term and without instruments. Unsteady gait appeared early, also slow speech and nystagmus. Pupils were equal. An occasional Babinski was obtainable. The speech was slow and monotonous, and there was pronounced evidence of degeneration. No sensory disturbances.

Massalongo reported two children who presented symptoms of spastic paraplegia and disseminated sclerosis. Parents were related; maternal uncle was deaf mute; a cousin was idiotic and a maternal grandfather was inebriate. The children were a boy of six and a girl of four. Symptoms began in the boy at two and a half years, and in the girl at twenty-two months, after acute illness in both. Symptoms were spastic paraplegia, intention tremor, hesitating and scanning speech, exaggerated tendon reflexes, positive Babinski and nystagmus. Intelligence normal.

d'Abundo described infantile family multiple sclerosis, in two brothers and a sister whose parents were first cousins. In the mother's family there was history of arthritis. All the children were born at term with normal labor, excepting the second child, who required forceps. The first case, a girl of six and a half years, walked and talked at fifteen months. After an attack of fever at three years, disturbances of speech, nystagmus, oscillatory intention tremor developed. The gait was impossible on account of the violence of the tremor. Deep reflexes were normal, and there was no Babinski phenomenon. There was retrolabial neuritis with incipient atrophy. Mentality was reduced after fever. Speech was defective, indicating tremor of the muscles as existed elsewhere. The second case, age two and a half years, a brother, after an attack of pneumonia at two years, developed similar symptoms. The third

case, a boy, developed similar symptoms following an attack of intestinal fever. In this case paralysis with profound wasting of the entire body developed, with epileptiform seizures and mental deficiency.

Bäumlin reported four sisters in whom in the third to fourth year there developed uncertainty in gait, with choreiform movements, intention and oscillatory tremor, nystagmus, transitory strabismus, and exaggerated tendon reflexes. The sphincters were not affected, and there was no paralysis. There was mental weakness, and epileptiform attacks occurred toward the end of life in three cases. In one of the cases the post-mortem findings were negative. Family history negative, except the father had tremor after an attack of typhoid fever at fourteen years of age. The oldest child died at seven and a half years of age. Another child at five years old developed normally until occasional strabismus appeared. After an attack of intestinal catarrh uncertain gait, choreiform movements and mental deterioration ensued. There were lateral nystagmus, intention tremor, uncertain gait, exaggerated reflexes and diminished mentality.

Carini reported two cases of disseminated sclerosis in the same family. The first case, a child of four years of age, whose mother suffered from convulsions, probably hysterical, began at one year to exhibit nystagmus, and was less firm on her feet. She then became paraplegic, and later the arms became involved, and both legs and arms spastic. Patellar reflexes exaggerated, intelligence fair; speech undeveloped; there was no foot clonus, but reflexes of arms exaggerated. No sphincter, sensory, nor vasomotor disturbances. The second patient, aged twenty, showed nystagmus at six months of age. She had horizontal nystagmus, rhythmic movements of the head, intention tremor of the arms, rigidity of the arms and legs. Patellar reflexes active. No foot clonus, sensory, trophic nor vasomotor disturbances.

Totzke reported family multiple sclerosis in two cases in one family. First case, a girl of eleven years of age, with negative family history, after severe shock at nine years of age and again at ten years of age, developed exaggerated tremor of the hands. Speech disturbances began at eight years of age. Last eighteen months there were deterioration in mentality and an abnormal gait. Gait was spastic-pareto-ataxic. Left pupil did not react to light and right only slightly. There were moderate nystagmus and distinct paresis of the lower right facial muscles; the tongue deviated slightly to the right; speech was scanning; and there were white

spots on both papillæ. The knee jerks were exaggerated and there was a moderate degree of dementia. Second case, aged fourteen, sister of the first, developed symptoms between third and fourth years, with intention tremor. Gait not conspicuously abnormal except when walking rapidly, when there was a swaying motion. Knee jerks were moderately increased. Speech was scanning; left pupil hardly reacted to light; the right a little better. Vision markedly reduced and there was slight dementia.

Eichorst described the cases of a mother and son with symptoms of multiple sclerosis, consisting of intention tremor, horizontal nystagmus, scanning speech, exaggerated knee jerks, paralysis of the oculomotor nerve and atrophy of the optic nerve, mental deterioration and contracture of the hip and knee jerks. Post-mortem of mother, aged thirty-nine: There were numerous sclerotic areas in the spinal cord. No changes in the anterior or posterior spinal tracts nor in the medulla oblongata nor pons nor brain. The sciatic nerves showed atrophic nerve fibers and empty nerve sheaths. Autopsy in boy showed no disease of the pons or medulla. Sclerotic foci were present in the spinal cord. In the anterior and posterior roots there were atrophic fibers.

IX

A few instances are on record showing a family cerebral diplegia type.

Higier reported four cases in sisters, aged twenty-four, twenty, eighteen, and seventeen years respectively, the parents of whom were first cousins. The brothers were normal. The oldest at the age of eleven and a half years began to have a stiffening and uncertain gait, which progressed into a typical spastic walk. Later there developed a wasting and weakness of the hand, choking spells and diminution in the powers of vision. The disease began in the next two sisters at the age of ten in one and nine in the other. In the fourth case it began at the age of seven. Diminution of mentality occurred in all four. There was exaggeration of the deep reflexes of the arms and legs, frequent choking spells occurred in three of the girls; bradylalia and monotonous speech in two; strabismus in one, and subluxation of the lower jaw from excessive movements, and slight nystagmoid movements in one. Vision was reduced in all of the girls due to the progressive primary atrophy of the optic nerve. There were no pupillary, sensory, nor sphincter disturbances. These cases were diagnosed as coming under the category of cerebral diplegia.

Finzio described two cases of family spastic diplegia in a sister and brother, aged five and four years respectively. Alcoholism and syphilis appeared in the ancestry. Two other children showed exaggerated patellar reflexes. The first patient, aged five years, was born normally, and walked at one year. After an attack of measles at three years, developed a progressive disturbance of gait, and slightly spastic legs. The arms were also implicated, and the patient was apathetic, listless and capricious. The tendon reflexes were active. In the second case symptoms developed at two years of age. No sensory disturbances. Bradylalia was present to a certain degree in the oldest child.

Douillet described two cases of infantile cerebral diplegia. The first patient was born at term with easy labor. Epileptiform seizures occurred during the second, third, and fourth years. The speech was hesitating and drawling. The child walked with crossed-leg progression and the arms were rigid and the seat of athetosis. There was no sensory nor sphincter trouble, nor strabismus nor nystagmus. The second case was a boy of four, born normally, who developed rigidity of arms and legs at fifteen months. Intelligence undeveloped. A third member of the family had epileptic form of attacks at thirteen months of age. There was an alcoholic history in his paternal grandfather and maternal grandmother. The maternal grandmother died insane.

Hagenbach-Burekhardt reported three children in one family with cerebral diplegia. Family history was negative. Two of the patients were twins, three and a half years of age. They were never able to walk properly, and had to be supported, walking on their toes. Limbs were rigid and upper extremities not involved. Intelligence was subnormal. No muscular atrophy or sphincter troubles. Both patellar reflexes exaggerated, and intermittent foot clonus, active Achilles and tendon reflexes and positive Babinski. Third patient, a boy of two years, and like others, was born at term. Child could not walk, although active. Movements were good. Slight flexion of the knee and hip joints. Pes equino-varus was present but not distinct. No Babinski or other signs. Some latent contractures in upper extremities.

Lederer presented three children, a girl of eleven, and two brothers of six and seven years of age, in whom gradually developed, between two and four years, rigidity of the legs, speech disturbances, peculiar movements of the head and upper extremities, and arrested mental development, resembling a symptom-complex like that of Little's disease. There were also pseudo-bulbar paralytic symptoms.

Vizioli reported three boys and a girl in same family. Family history negative. Children born at term, under normal conditions. Symptoms first appeared at the walking age, consisting of rigidity of the legs, which soon extended to the rest of the body. None could walk and the feet were in equino-varus position. Muscles of the neck and face involved; tendon reflexes exaggerated; no sphincter troubles, nor nystagmus, strabismus, nor sensory troubles. Mental condition good. Speech hesitating, nasal and slow. In one, speech was practically impossible.

Dercum described three cases of the family type of cerebral diplegia. Three children of the third wife of a healthy father presented marked spastic diplegia. A paternal aunt had a child similarly affected. In the cases of the patients described, the birth was normal and at term. Case one was well until sixteen months of age, and could walk without assistance and talk a few words. After convulsions, lost the power of speech. After this rigidity of the legs appeared, and this extended to the arms. Athetoid movements of the hands occurred occasionally. Speech very defective. Finally idiocy developed. Second case, aged six, developed until four years. After moderately severe attack of measles became markedly spastic. He had also choreiform movements besides athetoid movements, petit mal attacks and defective mentality. The third case developed well until two years old when she had an attack of measles, and began during convalescence to show symptoms of diplegia and epilepsy. Reflexes exaggerated. No nystagmus in any case.

Brower described four cases of diplegia in a family of five. Family history of mother good, but in father's ancestry there is history of inebriety. Father had nystagmus and was weak in the legs, his patellar reflexes were absent, and his speech was peculiar and hesitating with excessive movements of one side of the face. The four children were born at term with normal labor. The first child, aged thirteen, was never able to walk, sit alone or feed himself. Talked until eight years of age, and speech became imperfect after an attack of fever. Deep reflexes exaggerated. There was nystagmus, internal strabismus, athetosis, motor paralysis of the legs and arms, contractures, rigidity and atrophy, difficulty in swallowing. Sensation was normal and the memory good. Deficiency was probably present at one month or six weeks of age. Never talked, however. After an attack of erysipelas at four months, the symptoms developed. Third child, aged four years, at sixteen months presented all the symptoms except atrophy and athetosis. Fourth

child developed dysphagia and nystagmus three weeks after birth and presented the same symptoms with the exception of atrophy and athetosis. The author believes this to be the result of a pathological process of intra-uterine life.

X

The pathology of these cases remains still somewhat obscure. Our knowledge of the disease depends largely on clinical studies.

Strümpell described the first case with autopsy. The anatomical lesion consisted of pure sclerosis of the pyramidal tracts, and slight degeneration of the tracts of Goll and of the cerebellar tracts.

A second case of Strümpell's showed typical degeneration of the pyramidal tracts, especially in the thoracic and lumbar regions; a slight degeneration in Goll's tracts, which disappeared in the middle thoracic region; the ganglion cells were normal, and the cerebellar tracts were only slightly affected, if at all.

In two of Newmark's cases the lateral pyramidal tracts showed a slight change which was more pronounced in one than in the other. The postero-median tract was implicated, especially in the cervical region. In a third case described by Newmark, there was a degeneration of the lateral pyramidal tracts gradually increasing upward, and a degeneration of the columns of Goll increasing upward. Betz cells were lacking in one case.

Kollarits described the autopsy of the case previously reported by Jendrassik. The spinal cord was flat with deep septi. The gray matter was small. The lateral pyramidal tracts were degenerated on both sides, more so in the lower part, the degeneration extending to the cervical region. Goll's tracts showed little change; comparatively more marked in the center of the dorsal portion. This degeneration extended upwards to the first cervical segment and downwards to the lower dorsal segments. The cells of the anterior horns showed no reduction in size. The central nervous system otherwise as well as the peripheral nerves were normal. The gastrocnemius muscles showed partial fatty degeneration, the muscle fiber being reduced in width. This therefore was a primary degeneration. Some normal nerve fibers were present among the diseased ones. These have been described by some authors as not belonging to the pyramidal tract. (Boucharde, Marie, Bechterew.) Bechterew believed that they belonged to an earlier period in development. More of these healthy fibers were found in the lumbar region than in the dorsal region.

Bishoff reported the anatomical findings of two cases previously

reported. In these cases there was finally mental deterioration, rigidity of the legs, clonus, sluggishness of the tongue and facial muscles, indistinct and slurring speech. There was no muscular atrophy nor ocular symptoms and the tactile sense was normal. There was considerable enlargement of the lateral vessels of the brain. There was possibly some reduction of the large motor pyramidal cells of the motor cortex, otherwise the brain histology was normal. There was no change in the cerebellum, the corpora quadrigemina nor in the pons. The fibers of the pyramidal tracts in the medulla oblongata were attenuated and the glia tissue was somewhat increased. In the spinal cord there was a dearth of fibers of the lateral pyramidal tracts increasingly so towards the dorsal portion. There was also a loss of fibers in the median portion of the Goll's tracts and the number of anterior horn cells was reduced, increasing in degree from the cervical to the thoracic regions. The degeneration represents a primary disease of the tracts.

In Pelizzi's case the autopsy showed a degeneration of the nerve cells and of the ganglia in the retina. There was pronounced peripheral chromatolysis especially marked in the polymorphous cells; accumulations of yellow pigment in the pyramidal cells; almost complete loss of the fibers of the cortex in the frontal and parietotemporal lobes, less pronounced in the occipital areas. There was sclerosis of the pyramidal tracts, especially in the internal capsule, pronounced in the medulla oblongata and the crossed and direct pyramidal tracts being equally involved. There was sclerosis of Flechsig's and Gowers' tracts, of Lissauer's zone, and slight sclerosis of Goll's tracts. There was marked peripheral chromatolysis of the cells of the anterior horns, especially in the lumbar cord, and a notable reduction and atrophy of the fibers in the related anterior roots. The intervertebral lumbosacral ganglia showed peripheral chromatolysis associated with the disappearance of the myelin sheath in some of the fibers of the related posterior roots.

It must be noted that there were mental changes in these cases and the gait was cerebral ataxic; therefore not a pure case of the Strümpell type.

In the case described by Pesker there was retarded development of the entire spinal cord system of fibers, including complete obliteration of the cerebellar and lateral pyramidal tract, and Clarke's columns without sclerosis. This case was not a pure case, but presented tremor, muscular atrophy and nystagmus.

Bourneville and Cruzon reported two cases in brothers, thirteen and ten years of age, in which the symptoms consisted of nystagmus

and strabismus, paralysis with contracture of all the members, exaggerated reflexes and high-grade idiocy. Autopsy showed atrophy of the cerebellum and of the pons and diminution of the fibers of the pyramidal tracts.

In the case of Mertzbacher in which the symptoms led to a diagnosis of multiple sclerosis, the autopsy was as follows: There was absence of the medullary sheaths of the white matter of the hemispheres, pons and cerebellum. Here and there only were there any medullary fibers found intact and only for a short distance. The fibers of the internal capsule were less affected. A few fibers were found in the peduncles, the pons and the medulla oblongata. There was a high-grade cerebral atrophy due to the loss of axis cylinders and medullary sheaths. The disease he believed was evidently primarily an extracortical manifestation. Histopathologically it presented an aplasia of the axis cylinders. He suggested the term *aplasia axialis transcorticalis congenita*.

Eichorst describes a case of multiple sclerosis with the autopsy findings as follows: Autopsy on mother, aged thirty-nine: Hemorrhagic pachymeningitis below the pons. Diffuse sclerosis of the brain. Multiple sclerosis of the spinal cord. Atrophy of the optic nerve. Microscopically numerous sclerotic foci extending from the external border of the white matter one half mm. inward involving the anterior and lateral tracts. There were numerous small sclerotic foci of this character. The posterior tracts remained free. On cross section in the cervical region the fibers were conserved and seemed to be unusually large. There was a small cavity in the lower thoracic region in the anterior part of the right posterior tract and extending into the posterior longitudinal fissure and into the canal. It had no wall of its own and suggested a hemorrhage with softening and resorption. No sclerosis of the medulla, pons, nor brain. The second case, that of the son, showed the sclerotic changes exclusively in the spinal cord. There were two types of foci, one visible macroscopically and the other one visible only under the microscope. The latter was found only in the cervical region in the anterior third of the posterior tracts. On cross section numerous fibers could still be seen. The sclerotic foci were seen in the thoracic and upper lumbar regions, presumably in the anterior two thirds of the lateral tracts, but in places extended into the anterior tracts. In the lumbar region there was a small sclerotic area found in the medium portion. There were nests of atrophic nerve fibers in the anterior and posterior roots along the entire extent of the spinal cord. No changes were found in the muscles but similar

changes were noted in the peripheral nerves, although not so pronounced.

Baumlin also reported the autopsy findings in a case of family disseminated sclerosis. Macroscopically, the brain was normal. No microscopical examination made. There was lepto-meningitis in the dorsal and lumbar regions. The lumbar cord was intact. In the lower dorsal region there was a very slight obliteration of the fibers in the outer portion of the marginal zone of the lateral tracts. A similar condition was present in the cervical region. Here also there was a reduction of fibers in the small zone between Goll's tracts and Burdach's tracts. Thus there was no evidence of disseminated sclerosis.

Brissaud (91) described two brothers with symptoms of disseminated sclerosis in which the autopsy showed, however, only a sclerosis extending over the pyramidal tracts, a disseminated sclerosis of Gowers' tracts, and an almost imperceptible sclerosis of Goll's tracts.

Lederer described a case resembling Little's disease with autopsy. An autopsy was made on a little girl which resulted as follows: Macroscopically the brain was normal and the spinal cord atrophic. Microscopically both brain and spinal cord showed defect in cells and fibers, with numerous undeveloped ganglion cells. Detailed histological report was to follow.

In one of Baumlin's cases there was an absence of post-mortem change.

Raymond (92) and Rose also reported a case with autopsy in which the findings were negative.

Reviewing the pathology of these cases, it must be acknowledged that the pathology is not very clear. The findings in Strümpell's two cases and Newmark's three cases are very similar, consisting of a degeneration of the pyramidal tracts, the tracts of Goll, and the cerebellar tracts in Strümpell's case, and the same findings in Newmark's cases with, however, the degeneration of the cerebellar tracts lacking. Kollarits found degeneration of the pyramidal tracts and slight degeneration of Goll's tracts. Bischof found primary degeneration in the lateral tracts and Goll's tracts and some diminution of the cells of the anterior horns. In Pelizzi's case there was involvement of the pyramidal tracts especially in the internal capsule and extending throughout the cord. There was also involvement of Flechsig's and Gowers' tracts, and of Lissauer's zones and of Goll's tracts. There was also a change in the cells of the anterior horns, of the intervertebral lumbosacral ganglia and the pyramidal

tracts of the cortex. These cases show more or less similar pathology.

In the case described by Pesker the lesion was a retarded development of the entire spinal cord system of fibers without sclerosis, and in Bourneville and Cruzon's cases there was an atrophy of the cerebellum and pons, and diminution of the fibers of the pyramidal tracts. In two cases of Bäumlín and Raymond and Rose, no post-mortem changes were observed. In one case described by Lederer, which resembled Little's disease, a detailed histological study was lacking and no conclusion can be reached.

There remain four cases of disseminated sclerosis to consider in which an autopsy was made. Mertzbacher's case showed absence of medullary sheaths of the white matter of the hemispheres, pons and cerebellum. In Eichorst's case there were numerous small sclerotic foci in the spinal cord, but not in the medulla oblongata nor brain. In the second case he described, the sclerotic patches were exclusively in the cord and were of two types, one microscopic and the other macroscopic. In Baumlin's case there was no evidence of the findings characteristic of disseminated sclerosis, but there was present a lepto-meningitis. No microscopic study was made. Brissaud described two cases showing disseminated sclerosis, in which the sclerosis extended over the pyramidal tracts, and there was disseminated sclerosis of Gowers' tracts and slight sclerosis of Goll's tracts.

LITERATURE

1. Strümpell. Deutsch. Ztschr. f. Nervenhe., 1904, xxvii, 291.
2. Oppenheim. Berl. klin. Wochenschr., 1895, xxxii, 733.
3. Spiller. Philadelphia Med. Jour., ix, 1129.
4. Raymond and Rose. L'Encephale, 1909, iv, 209.
5. Jendrassik. Deutsch. Ztschr. f. Nervenhe., 1902, xxii, 444.
6. Delearde et Minet. Rev. de Méd., 1908, xxviii, 181.
7. Voss. Neurol. Centralbl., 1909, xxvii, 513.
8. Trénel. Compt. Rend. Soc. de Biol., 1898, vi, 746.
9. Giovanardi. Riform. Med., 1897, xii, 754.
10. Courtellemont. Rev. Neurol., 1907, xv, 1065.
11. Bäumlín. Deutsch. Ztschr. f. Nervenhe., 1901, xx, 313.
12. Morquio. Rivista Médica del Uruguay, 1903, vi, 355.
13. Cafiero. N. Rivist. Clinico-therap., 1911, xiv, 499.
14. Schönfeldt. St. Petersburg Med. Wochenschr., 1906, n. f., xxiii, 355.
15. Naef. Inaug. Dissert., 1885, Zürich.
16. Finzio. La Pediatria, 1897, v, 139.
17. Massalongo. Riv. Crit. di Clin. Med., 1904, v, 233.
18. Lederer. Mittheilung. d. Gesellsch. f. inn. Med. u. Kinderheilk. in Wien, 1912, xi, 70.
19. d'Abundo. Neuropat. Psichiat. ed Elettroterap., 1910, iii, 1.
20. Carini. Archiv. Pat. Clin. Infantile, 1903, ii, 129.
21. Totzke. Inaug. Dissert., Berlin, 1893.
22. Jones. Rev. of Neurol. and Psychiat., 1907, v, 98.

23. Holmes. *Rev. of Neurol. and Psychiat.*, 1905, iii, 256.
24. Gee. *St. Bartholomew's Hosp. Rep.*, 1889, xxv, 81.
25. Hochhaus. *Deutsch. Ztschr. f. Nervenhe.*, 1896, ix, 201.
26. Abrahamson. *JOUR. NERV. AND MENT. DIS.*, 1902, xxix, 287.
27. Dercum. *JOUR. NERV. AND MENT. DIS.*, 1897, xxiv, 396.
28. Archard et Fresson. *Gaz. Hebdom. de Méd. et de Chirur.*, 1890, xliii, 1225.
29. Ganghofner. *Zeitschr. f. Heilk.*, 1896, xvii, 343.
30. Schultze. *Deutsch. Med. Wochenschr.*, 1889, xv, 287.
31. Cestan et Guillaïn. *Rev. de Méd.*, 1900, xx, 813.
32. Vizioli. *Annal di Nervol.*, 1898, xvi, 172.
33. Pelizzi. *Rev. Speriment. de Freniat. e de Med. Legale*, 1906, xxxii, 1.
34. Merzbacher. *Med. Klin.*, 1908, iv (part 2), 1952.
35. Santo de Santis & Lucangeli. *Jour. Ment. Path.*, 1905, vii, 1.
36. Bourneville et Cruzon. *Le Progrès Méd.*, 1901, xxx, 272 (ser. 13).
37. Douillet. *Dauphine Méd.*, 1896, xx, 172.
38. Hagenbach-Burckhardt. *Zentralbl. f. Kinderheil.*, 1908, xiii, 89.
39. Freud. *Neurol. Centralbl.*, 1893, xii, 512.
40. Brower. *Medicine*, 1897, iii, 23.
41. Batten and Wilkinson. *Brain*, 1914, xxvi, 341.
42. Krafft-Ebing. *Deutsch. Zeitschr. f. Nervenheilk.*, 1900, xvii, 87.
43. Lorrain. *Thèse de Paris*, 1898.
44. Bernhardt. *Virchow's Archiv*, 1891, cxxvi, 59.
45. Pauly et Bonne. *Rev. de Méd.*, 1897, xvii, 201.
46. Cadwalader. *JOUR. NERV. AND MENT. DIS.*, 1912, xxxix, 688.
47. Dreschfeld. *Med. Times and Gaz.*, 1878, i, 140.
48. Mahaux. *La Clinique*, 1901, xv, 193.
49. Chugunow. *Korsavoka*, 1913, xiii, 515.
50. Soques. *Rev. Neurol.*, 1895, iii, 1.
51. Modena. *Ann. di Neurol.*, 1905, xxiii, 12.
52. Ballet and Rose. *Nouv. Iconog. d. la Salpêtrière*, 1905, xviii, 404.
53. Melotti e Cantalamessa. *Il Policlinico (Suppl.)*, 1895, i, 379.
54. Seeligmüller. *Deutsch. med. Wochenschr.*, 1876, iii, 185.
55. Higier. *Deutsch. Ztschr. f. Nervenhe.*, 1906, ix, 1.
56. Reynolds. *Brain*, 1904, xxvii, 163.
57. Gabbi. *Il Policlinico*, 1896, iii, 309.
58. Raymond et Souques. *Presse Méd.*, 1896, iv, 585.
59. Erb. *Deutsch. Ztschr. f. Nervenhe.*, 1895, vi, 137.
60. Bramwell. *Clinical Studies, 1909-10*, viii, 344.
61. Ballet. *Rev. Gen. de Clinique et de Therap.*, 1905, xix, 501.
62. Pulton. *JOUR. NERV. AND MENT. DIS.*, 1909, xxxii, 371.
63. Hoffman. *Deutsch. Ztschr. f. Nervenhe.*, 1913, xvii-xviii, 241.
64. Kuhn. *Deutsch. Ztschr. f. Nervenhe.*, 1902, xxii, 132.
65. Bonchard. *Jour. Soc. Méd. de Lille*, 1902, xxv, 25.
66. Philip. *Brain*, 1885-6, viii, 520.
67. Dobrochotow. *Deutsch. Ztschr. f. Nervenhe.*, 1913-14, xlix, 1.
68. Head and Gardiner. *Brain*, 1904, xxvii, 282.
69. Eichorst. *Virchow's Archiv*, 1890, xlii, 173.
70. Pelizaeus. *Archiv. f. Psychiat.*, 1885, xvi, 698.
71. Bayley. *JOUR. NERV. AND MENT. DIS.*, 1897, xxiv, 697.
72. Newmark. *Amer. Jour. Med. Sci.*, 1893, cv, 432.
73. Tooth. *St. Bartholomew's Hosp. Rep.*, 1891, xxvii, 7.
74. Wirschubski. *Neurol. Centralbl.*, 1913, xxxii, 1025.
75. Pick. *Wien. med. Wochenschr.*, 1895, xlv, 75.
76. Cramer. *L'Encephale*, 1908, iii, 28 (Part 1).
77. Levy. *Inaug. dissert.*, 1908, Freiburg i. Br.
78. Ogilvie. *Proc. Roy. Soc. Med.*, 1907-08, i, Neurol. Sect., 91.
79. Jacobi. *Reform. Med.*, 1890, vi, 1322.
80. Kollarits. *Deutsch. Ztschr. f. Nervenhe.*, 1906, xxx, 203.
81. Strümpell. *Archiv. f. Psychiat. u. Nervenkrank.*, 1880, x, 711; *Autopsy-Archiv. f. Psychiat. u. Nervenkrank.*, 1886, xvii, 218.
82. Strümpell. *Deutsch. Ztschr. f. Nervenhe.*, 1893, iv, 173.
83. Moore. *Brit. Med. Jour.*, 1898, i, 690.

84. Mann. *Il Policlin.*, 1912, xix, 1342.
85. Bischoff. *Jahrbuch. f. Psychiat.*, 1902, xxii, 109.
86. Lawrence. *Post Graduate*, 1910, xxv, 66.
87. Pesker. *Thèse de Paris*, 1900.
88. Giese. *Deutsch. Ztschr. f. Nervenh.*, 1900, xvii, 71.
89. Kojevnikoff. *Rev. de Méd. (en Russe)*, 1895, *Abst. Rev. Neurol.*, 1895.
90. Weisenburg. *Arch. Diagnosis*, 1900, ii, 167.
91. Brissaud. *Rev. Neurol.*, 1907, in *Dobrochotow*.
92. Raymond and Rose. *Rev. Neurol.*, xvii, ii, 781.

Society Proceedings

AMERICAN NEUROLOGICAL ASSOCIATION

MAY 8, 9 AND 10, 1916

The President, DR. L. F. BARKER, Baltimore, in the Chair

The president delivered an address entitled War and the Nervous System. (See this *Journal*, vol. 44, p. 1.)

STRUCTURAL AND FUNCTIONAL CORRELATIONS IN THE LIFE OF THE EMBRYO

By Stewart Paton, M.D.

Interesting and important correlations have already been established between the functional and the structural changes in the embryo incident to the process of growth. Those relating to the nervous system are of value not only to the embryologist, but they throw considerable light on problems the solution of which has eagerly been sought for both by physiologists and psychologists. The summary of some recent work carried on by the writer along this line is given, but the publication of the details must be reserved until later.

The observations made by Coghill on amphibians have been confirmed for the higher vertebrates (chick, guinea-pig) in regard to the nature of the primary neural mechanisms differentiated in the cord, namely a tract occupying the position of the longitudinal fasciculus, appearing as low down as the cord a fourth of the cord and extending rostrad to the exit of the third nerve. There is practically no doubt of the motor character of this tract. On cross sections a well differentiated neural supply has reached and in many instances penetrated the myotome; but at this stage (20-somite chick) not a trace of sensory fibers exists. The sensory half of the reflex arc is still wanting. This condition has an important bearing, as it shows among other things the relatively little primary value of the sense organ and the consequent incapacity of the organism to pick up incident stimuli which might, as is so often affirmed, modify the development of the nervous system.

An excellent illustration of the long precedence in point of time that structure often seems to bear to function is found in the very early differentiation of the third nerve, taking place at a time when there can be no physiological demand made upon this mechanism.

The differentiation of sensory nerve tracts and the subsequent transference and organization of sensations occur in the following order: first probably those related to temperature and chemie stimuli, followed by those for the conduction of electric touch and pain in the order named. In the genesis of the nervous system there does not seem to be any evidence in the higher organisms that the development of these structures is modified materially by impinging stimuli. The functions of the sensory half of the arc are superimposed upon the motor responses in a manner which makes it impossible to resolve the higher forms of response into any elements spe-

cifically distinct from those forming the foundation of the complex. The substitution of a broad biological point of view for the restricted neurological one is greatly to be desired in studying all the different forms of response in which the nervous system is a prominent factor.

As soon as the central nervous system is differentiated sufficiently to give signs of approaching functional activity various organs are included within the circuit. The first is naturally the heart, and this receives a supply from the vagus at a very early period. At the period when the organism begins to respond to stimuli impinging on the surface of the body the thyroid gland has received well differentiated and large bundles of neurofibrils. Unfortunately with the present methods of investigation it is not possible to decide when the embryonic cells in this organ become capable of secretion. Following the thyroid the next organs to be included are probably the adrenals but here again as in the case of the thyroid we cannot assume the appearance of nerves to be an indication of the onset of functional activity; probably however the very fact that these organs receive their neural supply at such an early period of life is an additional indication of the close relationship they bear to the functional activity of the nervous system.

A number of interesting problems are suggested by the order of sequence marking the entrance of different organs into the neural circuit. These correlations are not only important in regard to the neural functions, but they also suggest possible variations in the defense-capacity of the organism against injurious external influences according to the limitation or the extent of the neural circuit imposed during the different epochs in the growth of the embryo.

Dr. J. J. Putnam asked to what extent Dr. Paton thought that observations of this sort can be used as a basis for psychological inferences of a final sort. He remembered hearing, many years ago, a discussion of the Darwinian theory between Professor E. S. Morse of Salem, who was a pronounced Darwinian, and Professor Hyatt of Boston, whose views represented essentially those of Professor Cope of Philadelphia. The view which Mr. Hyatt took was that when, in the course of evolution, consciousness came into existence, a new set of influences began to make themselves felt, through which the subsequent history of evolution was materially altered.

Dr. Joseph Collins asked Dr. Paton whether it were his conviction that the cranial autonomic develops before the sympathetic system and whether the cranial autonomic develops before the sacral. It seemed to him that Dr. Paton had made an important observation bearing upon our attempt at interpretation of the vegetative nervous system, if he has shown that the thyroid gland is so far in advance in time of development to the adrenals. It is being generally accepted, largely owing to the physiologists, that the adrenals are the activators of the thyroid gland, and that at least the emergency power of the latter stands in determinated relationship to the adrenals.

Dr. Frederick Tilney said he had seen a great many embryos of chicks as well as other vertebrates at this stage, and he questioned very much whether the anlagen of the thyroid or the suprarenals are yet functionally active enough to justify the statement that they are then under the control of the nervous system. He believed they have not passed beyond an undifferentiated stage.

Dr. Stewart Paton said that the questions asked him had opened up a field too extensive even to be entered in a brief discussion.

It is well to remember that such a relatively simple mechanism as a reflex is in reality exceedingly complicated. If then there are difficulties of analysis at this level the responses at higher ones, particularly those that

interest the association-psychologists, are still more complicated. An appreciation of these conditions should make us less inclined to dogmatize about the "foundations of psychology."

The thyroid, as Dr. Tilney has pointed out, is well differentiated in the chick at 120 hours, and, as shown in the photograph, possesses, at this period, a well differentiated nerve supply. This gland, if we may judge by histologic characteristics and the presence of nerves, is ready to function before the adrenals, and considerably in advance of the sexual organs.

NEURAXIAL DIFFERENTIATION OF THE FIBERS FROM THE HORIZONTAL AND THE FIBERS FROM THE VERTICAL SEMICIRCULAR CANALS, DEMONSTRATED BY MEANS OF THE BARANY TESTS

By Charles K. Mills, M.D., and Isaac H. Jones, M.D.

Cajal has shown histologically that fibers from the vestibular portion of the eighth nerve enter Deiters' nucleus and continue from the inferior cerebellar peduncle into the cerebellum itself. This tract has been generally recognized and accepted. The writers believe (1) that this path includes the fibers from the horizontal semicircular canals exclusively, and (2) the fibers from the vertical canals have an entirely different course. The former are confined to the oblongata, while the latter ascend into the pons.

In twenty-eight cases in which the labyrinths themselves and the eighth nerves were normal and the horizontal canals gave normal reactions, the vertical canals failed in some or all of the well-known responses. That the labyrinths themselves were normal was made probable by the presence of perfect hearing, and corroborative evidence of neuraxial lesions was additional confirmation. In five cases stimulation of the vertical canals produced no nystagmus, no vertigo, no past-pointing and no falling, and yet violent projectile vomiting occurred. This showed that the vertical canals themselves were functioning; in fact, there was even a hyperactive response of the tenth nucleus to the stimulation of the canals. In one case in which the lesion was clearly thrombosis of the right posterior inferior cerebellar artery the right horizontal canal failed to respond normally, whereas reactions from the right vertical canals were normal.

Therefore, a central differentiation of the fibers from the different canals must exist.

In a case of Dr. Mills, a full recital of which is given in the paper, the fibers from the vertical canals failed to respond, while those from the horizontal canals reacted. In this case a necropsy was obtained and a microscopical examination with serial sections was made by Dr. William G. Spiller in the Laboratory of Neuropathology of the University of Pennsylvania. A report of this histological investigation is included in the paper. It shows a glioma of the upper part of the pons, the lower half of the pons and the oblongata being normal. This proves that the vertical canal fibers extend as far at least as the middle of the pons.

In a case of Dr. T. H. Weisenburg, symptoms of involvement of the right sensory portion of the fifth nucleus and the right sixth nucleus and sensory symptoms in the left extremities indicated a lesion in the right side of the pons posteriorly in the region of the middle cerebellar peduncle. In this case stimulation of the right vertical canals failed in all responses, whereas the right horizontal canal and all the canals of the left ear gave normal reactions.

In the experience of the writers interruption of the impulses from the

vertical canals is produced by tumors of the cerebello-pontine angle, internal hydrocephalus causing pressure on the floor of the fourth ventricle, and intracerebellar tumors causing pressure on the pons.

Dr. Smith Ely Jelliffe said one point he would like to ask Dr. Jones to explain. Whereas it seemed to him not at all improbable that certain inferences may be drawn from the specific stimulation of the horizontal canals by movement, does he mean just what he says that the *horizontal* canal is influenced by the heat? An altered position of the head will change the relationship of the heat stimulus to the canal fluid which will be set in motion, hence is it not rather more true to say that that canal which is horizontal in the position adopted will be the canal that is stimulated?

Dr. Isaac H. Jones said that Dr. Jelliffe asked for the explanation of the caloric test. Cold water produces chilling of the external part of the semi-circular canals; this increases the specific gravity of the endolymph and consequently the chilled endolymph drops in the canal that is in the vertical plane.

The Ford and Overland automobiles have a "thermo-syphon system" with which many of us are familiar. When the engine becomes hot, the water rises and goes forward into the top of the radiator, there cools, sinks to the bottom of the radiator, and then goes down and back to the engine. This is exactly what occurs in the semi-circular canals: cold water causes a current in the downward direction, and hot water causes a current in the upward direction.

This may be proved as follows: incline the head backward 60° ; this puts the horizontal canal in the vertical position. Douche with cold water; there occurs (1) horizontal nystagmus to the left, (2) sensation of rolling to the left, (3) past-pointing to the right, (4) a rolling or falling to the right.

Now without any further douching, merely tilt the head forward 120° , which puts the horizontal canal in the vertical plane, but exactly upside down from the previous position; there immediately appears, (1) horizontal nystagmus to the *right*, (2) sensation of rolling to the *right*, (3) past-pointing to the *left*, (4) a rolling or falling to the *left*.

This, of course, disposes absolutely of the theory that cold water causes a depression and hot water causes a stimulation of the ears. Merely by altering the position of the head there are produced diametrically opposite phenomena.

Dr. Harvey Cushing, Boston, read a paper entitled: Anosmia as a False Localizing Sign in Cerebral Lesions. He gave a demonstration of the mechanical constriction of the olfactory nerves producing anosmia in a case of unlocalized tumor with pronounced pressure symptoms.

Dr. Bernard Sachs thought the difficulties met with in this case could be paralleled by the experience that others have had, but it seemed to him that the mistake that we are all likely to make nowadays is that we have lost sight of a very old principle in topical diagnosis of intracranial disease, viz., that differences are to be drawn between the direct and indirect symptoms due to any intracranial neoplasms. Among indirect symptoms those pointing to involvement of the olfactory nerves and the 6th nerves are most important. Both structures are relatively in the same position; they are first of all very flat structures, they are in the immediate proximity of the bony structures at the base and any compression of the entire mass of the brain is very likely to exert pressure upon these two structures. So far as the hypophysis itself is concerned we have had to determine whether the symptoms involve that or not. That is the structure which leads much more often to indirect than to direct symptoms. As to the sella turcica, we have come to

the conclusion that the enlargement of the sella turcica does not necessarily point to involvement of the hypophysis or of the proximity. It is extremely interesting to hear that Dr. Cushing has met with those difficulties in diagnosis. This is a plea for indirect symptoms when they seem to refer to structures at the base.

Dr. Foster Kennedy said that the title of Dr. Cushing's paper may possibly lead to a considerable misconception in that while anosmia,—by which he understood bilateral anosmia,—often enough is a false localizing sign in cerebral tumor, *unilateral* anosmia is frequently highly valuable. Some years ago, Dr. Kennedy was able to bring together six cases of subfrontal growth,¹ in all of which a very precise symptom-complex occurred—namely, ipsilateral retrobulbar neuritis producing central scotoma and blindness with concomitant ipsilateral anosmia. These phenomena resulted from direct pressure by the neoplasm respectively on the optic nerve and olfactory bulb.

In consequence of these observations, if Dr. Cushing meant unilateral anosmia in his title, Dr. Kennedy was unable to agree with his conclusions.

Dr. Ernest Sachs asked whether there were any more accurate way of making use of anosmia as a localizing sign. It is very often difficult to determine whether the loss of smell is due to a central disturbance or a peripheral lesion. One meets with instances in which a patient states that he recognizes an odor but cannot name it. Even an intelligent patient will sometimes tell you that he can smell but is unable to name the odor. Dr. Sachs had never quite had the courage to use this condition in a localizing diagnosis. He wondered whether that inability to name an odor but be aware of its presence may not be an evidence of a central disturbance in contradistinction to a peripheral one. He would like to know from Dr. Cushing whether he has had this experience of having patients unable to name odors and to what use he has put it. He agreed with Dr. Kennedy that a unilateral anosmia is of great value as a localizing sign.

Dr. Hugh T. Patrick said it may be worth while to mention that a great many people have a poor sense of smell and so inability to name things is really due to lack of recognition. More than twenty years ago an acquaintance of his was greatly interested in devising a method of accurately testing the sense of smell, and since that period Dr. Patrick had been interested in noticing that many people have a poor sense of smell and also a very poor capacity for telling what they do smell. So unless there is a very well defined unilateral disturbance of smell in the absence of local lesion he thinks the symptom of little value in the study of intracranial growths.

Dr. L. F. Barker said Dr. Cushing had shown that tumor of the posterior part of the brain may cause compression of both olfactory tracts. A complete diagnosis in this case would involve not only the recognition of the existence of the tumor, but also the discovery of the lesions of the olfactory tracts. The anosmia would be a "false localizing sign" as regards the tumor but a "true localizing sign" as regards the lesions of the olfactory tracts.

Dr. Harvey Cushing said he was referring, of course, to complete anosmia as a distant symptom in a case of intracranial tumor and he desired to show how this might be produced by mechanical means. Dr. Kennedy was referring to the unilateral loss of smell which is, of course, often a valuable localizing sign. Dr. B. Sachs had mentioned that these so-called false localizing signs may indeed be of localizing value in that they occur so commonly in certain conditions. They are particularly common in sub-tentorial lesions. A good example is the abducens palsy which accompanies cerebellar tumors which Dr. Cushing believed to be caused by the constriction of the posterior cerebellar branches of the basilar artery. Thus in cerebellar lesion the weakness of the external lateral movements of one or

¹ Amer. Jour. of the Medical Sciences, Sept., 1911.

both eyes is common enough to make the palsy helpful in placing a tumor below the tentorium. Dr. E. Sachs had spoken of the difficulty of recognizing odors or the inability of naming them. Dr. Cushing recalled a picturesque statement of Gowers in that connection. He said, in explaining the inability of individuals to describe their sensations, that "our sensations transcend our vocabulary."

SENSORY DISTURBANCES OF CEREBRAL ORIGIN

By Alfred Gordon, M.D.

Eight anatomo-clinical cases were studied from the standpoint of sensory disorders. They are distributed as follows: three cortical cases (two hemorrhagic, one tumor); three capsular cases (one tumor, two softening); one thalamic case (tumor); one peduncular case (tumor of pituitary body). The special differential characteristics of each of these forms of sensory disturbance have been emphasized.

Dr. David I. Wolfstein said that in connection with the very interesting paper of Dr. Gordon he would report a rather unique case which recently came under his observation. A colored man had been brought into the receiving ward about ten days previously, but had been dismissed, nothing special having been noted. Returning, he was admitted to the Neurological Service. Convulsive movements were reported. On careful analysis these were seen to be right-sided facial, or facio-brachial in their inception, becoming generalized a little later on. In the onset period of these convulsive attacks there was conjugate deviation of the eyes to the right, and there was a marked Babinski at times on the right side only, at times also slight on the left side. Sensory impairment was as follows: a sense of numbness in the right face, which was called by the patient "stiffness, coldness" and a feeling of painfulness in the right arm. Subjectively also the face and arm *felt* clumsy. Tactile sense, with very fine pieces of cotton seemed everywhere intact; there was no impairment of the thermal sense. There was marked loss of the position sense, and mistakes were made in localization. The most marked defect, however, was in stereognosis; there was complete defect in the right hand for form and quality, less easily determinable in the face, but still present. Dr. Wolfstein did not make tests for pre-axial and post-axial disturbance, intending to do so later. A diagnosis of lesion—traumatic—in the anterior parietal region, with forward irritation of the arm and face centers was made, and a surgical consultation and X-ray were requested. The latter showed a most interesting finding. The patient had stated that he had been struck, but had not mentioned that his assailant had used a knife; this fact only occurred to him when he was being X-rayed. The plate showed the blade of a penknife sticking obliquely downwards and forwards to a depth of about three inches, from the post-central towards the pre-central area, as accurately as the measurements could determine. Dr. S. P. Kramer on the strength of the plate contented himself with the simple extraction of the broken-off blade, further measures, or greater exposure not being for the best interest of the patient. Their conscientious scruples whilst highly praiseworthy, of course, prevented them from accurately determining the exact area in which, in their case, accident had performed a very definitely localized experiment.

The patient promptly recovered; remained in the house long enough to show apparent recovery from the convulsions, but the sensory impairment remained uninfluenced. A week after the operation the patient left the ward, and had not been seen since.

Dr. H. Hoppe was particularly interested in one phase of Dr. Gordon's paper, namely that in one of the cases the sensory symptoms were predominant as compared to the motor. The case recalled a case of tumor in the arm center in which the first manifestation was pain in the tip of the index finger. This disturbance of sensation preceded the Jacksonian seizures and preceded the development of paresis by weeks or perhaps a month. The tumor was located in such a way as to cover both the ascending frontal and parietal convolutions. It was impossible to tell whether it started in the one or the other. The pain however was distinctly first. The other point Dr. Hoppe wished to make was in reference to the localization of the stereognostic sense. We know that the stereognostic sense is very complex and in a case which he observed, viz., one in which a tubercle was distinctly limited to the ascending frontal convolution, one of the symptoms was a disturbance of the stereognostic sense in the arm.

Dr. Alfred Gordon said the two points he would like to emphasize are: first, that in the case with the hemorrhage the latter was confined strictly to the parietal lobe. Here the most remarkable thing was that while the lesion did not extend any further, still a paresis was observed on the opposite side. He did not wish to enter into discussion of the sensori-motor localization. That is pretty well established by the histological researches, nevertheless this case is the most striking illustration of the possibility of occurrences of motor disturbances where the ascending parietal alone is involved. The second point is that in spite of the fact that the "carrefour sensitif" was involved in one case, no sensory disturbances were observed.

Dr. Samuel Leopold read a paper prepared by himself and Dr. E. Murray Auer, entitled: *Some Unusual Features of Jacksonian Epilepsy*. They spoke of the older views as to the nature and significance of this sign and the modern conceptions, the etiological factors, and the classification of spasms as to character and location.

Dr. Harvey Cushing read a paper entitled, *Tic Spasmodique Produced by Cerebello-Pontine Tumors*. He described cases of convulsive spasm in the facial territory as an early and striking symptom of cerebello-pontine tumors. These two papers were discussed jointly.

Dr. J. Ramsay Hunt referred to his contributions to the sensory functions of the facial nerve, in which he had emphasized the sensory route as an important factor in the production of reflex spasms of the face. Dr. Hunt has observed a series of these cases with reflex quiverings and spasms of severe degree in which some irritation was present somewhere along the pathway of the sensory system of the geniculate ganglion and he regarded such an exciting cause as the basis of the motor disturbance. He has also observed cases in which the facial spasm was sharply localized to certain groups of muscles, e. g., the auricular muscles. In one case there was only spasm of the auricular mechanism and platysmus. Evidently only certain cells of the facial nucleus were in a state of excitability. He thought it would be difficult to explain such a case so limited in its spasm, unless one thought of rather a limited form of reflex stimulation. These cases cannot be explained on the basis of irritation of the motor filaments of the nerve and the theory of reflex irritation of the sensory filaments of the seventh is more reasonable then to suppose that the nucleus of the seventh has been affected by distant pressure.

Dr. William G. Spiller said a number of years ago Dr. Mills and he had studied a case of convulsive spasm confined to one side of the face which seemed to be caused by a cortical lesion, and this symptom led to an unfortunate operation over the facial center. A necropsy showed a tumor of the cerebello-pontine angle. Usually in a convulsion of the face both sides of the forehead and the eyelids of both eyes are implicated in

the spasm. In the case reported by Dr. Leopold the spasm was strictly confined to one side of the face, even in the upper facial distribution and the lesion seemed to be cortical rather than of nerve origin. Recently Dr. Spiller had another case in which Jacksonian spasm of the face probably was caused by irritation of the facial nerve by a cerebello-pontine tumor.

Dr. E. Sachs said these convulsions, particularly in the face, are at times very puzzling, especially in young children. Dr. Schwab and he had been puzzled in the past year by seeing focal convulsions of the face confined to the lower two branches in which no other symptoms of any sort could be elicited, and the autopsy in the last case particularly showed absolutely nothing to explain the condition. The child had no fever suggesting any acute infection and up to the present time Dr. Opie has been unable to find any pathological change to account for it.

Dr. Williams B. Cadwalader stated that he had observed a case in which the first evidence of disease had been attacks of clonic movement of one side of the face without disturbance of consciousness or involvement of the other parts of the body. This was attributed to an irritation of the seventh nerve within the skull. Subsequently these attacks grew milder and finally stopped but the face had then become totally paralyzed.

Later the patient died. An autopsy showed that there was a tumor growing from the region of the cerebello-pontine angle and the seventh nerve had been diseased.

Dr. Peter Bassoe asked, in reference to Dr. Cushing's paper, whether it would not be better to use the term spasmodic tic.

(To be continued)

CHICAGO NEUROLOGICAL SOCIETY

FEBRUARY 17, 1916

The President, Dr. J. C. GILL, in the Chair

FURTHER OBSERVATION ON INTRASPINAL MEDICATION

By Geo. W. Hall, M.D., H. Culbertson, M.D., and C. Slaght, M.D.

Dr. George W. Hall said that eighteen patients were treated by intraspinal injections of mercury administered either in form of mercurialized serum, mercuric chloride or mercury succinamide. Reactions showed an increase in the temperature during the first twenty-four hours ranging from 99° F. to 103° F. The cell count in spinal fluid showed an increase in the number of cells ranging from 200 to 2,000 cells per cubic millimeter. The polynuclear cells predominated during this period. Patients complained of severe pain down the limbs during the first twenty-four hours following injections. Retention of urine occurred in two cases during the first twenty-four hours. Some cases required morphine to allay the pain following these injections. The bichloride and succinamide were given in doses of 1/100 to 1/50 grain, dissolved in 20 to 25 c.c. of spinal fluid.

Dr. Julius Grinker said that about eight or nine months ago he and his associates began the use of mercurialized serum, using the Mulford article, and made complete records of the cell count and the Wassermann changes. They had about five cases that were injected four or five different times. Most of them had four plus Wassermann, and with each injection it was noticed that the Wassermann had become less marked, so that the record from the laboratory read in almost all of the cases, three, two, one, with great

uniformity. All five cases showed this marked reduction in the intensity of the Wassermann reaction. A reduction in the cell count was also noticed, and, strange as it may appear, the fifth injection brought a report from the laboratory of a four plus Wassermann. The speaker could not explain it. At this time Dr. Grinker went away on his summer vacation, and on his return found that one of the cases had worked very strongly against the continuance of this treatment. He made propaganda against it, and for a long time they were unable to continue these injections, until they were resumed about two months ago.

Most of Dr. Grinker's observations with this treatment had been made on cases of tabes and cerebrospinal lues. He could not say that these patients improved clinically. He would have to stretch his imagination to say that any of them made any appreciable progress. The reactions with the Mulford preparation, on the whole, were not quite as severe as the reactions following the direct neosalvarsan injections into the spine, but he could not see very much difference; all of them were rather violent.

Another observation made was that after the first or second injection almost always the reaction became more marked. Whether this was due to some degree of anaphylaxis or not, he could not say. At any rate, the patients did not do so well after the third and fourth injections.

The same dose was used in all injections. Occasionally the dose was increased when the patient stood the first one well. Mulford puts out two grades—1/50 and 1/25. He used 1/25 when there was not much reaction after 1/50, but not in all cases.

Quite recently the internes on his service at the County Hospital had asked if he would not be willing to use injections of succinamide of mercury—evidently they heard of Dr. Hall's cases. One of the internes suggested that the succinamide does not produce as cloudy an appearance; does not precipitate the spinal fluid as, for instance, bichloride does. Bichloride forms a strong albuminate of mercury, a precipitate which might cause trouble, to obviate which they had used the mercurialized serum, whereas the succinamide of mercury may be dissolved in a small quantity of water and immediately suspended in the spinal fluid. Dr. Grinker then convinced himself that the succinamide does not cause as marked a precipitate, and consented to use it intraspinally in three cases on his service. Varying from Dr. Hall's experience, he found that in one case of paresis the succinamide produced a most violent reaction. The man developed a temperature of 104°. The other two cases had much milder reactions.

Dr. Patrick asked what the dilution was in the case that had the violent reaction.

Dr. Grinker said that he filled a large syringe full of spinal fluid, put the 1/50 grain of succinamide of mercury previously dissolved in 1 c.c. of normal solution into it, and then kept on diluting it and mixing it up by lowering the tube and raising it, so that in this way it was diluted in a very large quantity. The technique in this case was the same as in the direct neosalvarsan injections—by the gravity method.

Reduction in the number of lymphocytes was seen in those cases that were examined, and although it is premature to report on results, he would say that there is a laboratory improvement; clinically, however, he could not see very much change. The reactions in all the cases appeared several hours after injection, and this fact has been utilized by a certain laboratory in this city to urge the office injection of these cases intraspinally. The speaker, however, questions the advisability of intraspinal office injection.

Dr. Grinker thinks Dr. Hall and his internes are entitled to great credit for having charted these reaction changes so carefully, because such a detailed report might give others who attempt these injections an idea what to

expect. Of course we do get reactions, some of them very violent ones. But the speaker did not think that the type of reaction gave much indication as to what clinical results could be expected. One of his patients with an extremely violent reaction has shown most improvement. Others whose reactions were not so severe have not improved. Whether the reaction is a criterion for the kind of improvement to be expected clinically he did not know. He has one tabetic at the hospital, however, who is a perpetual reminder to him that intraspinal injections should be given with great caution. This man became paralyzed after an intraspinal injection of mercurialized serum—his legs and bladder have remained paralyzed after months.

Dr. Peter Bassoe thought the reactions reported by Dr. Hall, on the whole, must have been more severe than those from the Swift-Ellis injections. In the beginning, he saw quite a few quite severe reactions, with pains in the legs or headache requiring morphine, but after better methods of centrifuging the serum were used, there have been very few such severe reactions.

Dr. Bassoe has used the mercurialized serum a few times without any reaction whatever. It was made from the patient's serum by adding a solution of bichloride, according to the method of Byrnes.

Dr. E. F. Leonard asked how the pains referred to could be explained. Sometimes they occurred in the leg injected, and also in the other leg, and sometimes in the arms. Are they due to absorption of the drug or to injuring some of the filaments of the nerve?

Dr. Hall said that the laboratory report of these cases showed improvement in the Wassermanns, but yet they were positive except in one case, so that they have not gone far enough to make any statement about the Wassermanns with any definiteness. One can be misled by Wassermanns, if he depend entirely on that. The speaker has had a case of tuberculous meningitis in his service in the last three months, showing very strongly positive Wassermann in the spinal fluid.

As far as the injections of neosalvarsan are concerned (Dr. Culbertson and the speaker made about 135 injections), he states that there were no such reactions as in these cases reported; the complaints were not so great. The patients did have pain in the lower extremity, and so on, but the temperature was nothing like that in the cases just reported.

So far as clouding is concerned: Withdrawing the spinal fluid, twenty-four hours after the injection, it is cloudy—it is murky—it shows an albuminous element, like a cystitis would. But he did not find such cloudy fluid in the neosalvarsan injections, even when drawn off within a few hours. The spinal fluid was clear.

The dose of neosalvarsan was very small—only three milligrams—as compared with this. Two and a half to three milligrams were the highest doses. Secord speaks of .2 milligram showing a pronounced reaction.

Dr. Patrick asked a very pertinent question as to the dosage of the mercurialized serum. The speaker used the dosage as prepared by Parke, Davis and Company, so that 30 c.c. contain 1.50 grain of mercury. On an average, 24 c.c. were used, so that about 1.70 grain of mercury was given.

As to the question of injecting these cases in the office: The speaker thought it would be a most unwarranted thing, and practically criminal to inflict such a thing upon a patient in the office, in the first place, because the mechanical effects would make it absolutely injurious.

So far as clinical results in the cases reported are concerned, the speaker felt about it as he did about the treatment of epilepsy. None of us would say that a case of epilepsy was cured under three, four or five years of treatment. So far as coming to any conclusion as to any permanent results in these cases, it would be absolutely unreliable. He feels sure of improvement in some of these cases, especially after four or five injections. There is no question about the improvement.

So far as the pain is concerned, the speaker thought the pains were more severe with the mercurialized serum, and with the other forms of mercury, than with the injections of neosalvarsan. And yet it might not be fair to compare them in that way, because the neosalvarsan was used in very much smaller doses intraspinally as compared with the intravenous dose of mercury, of course.

CERVICAL RIB PRESSURE SYMPTOMS IN PATIENTS WHO
HAVE NO CERVICAL RIBS. (LANTERN SLIDE
DEMONSTRATION)

By Carl B. Davis, M.D. (by invitation)

Dr. Davis said he had seen a number of cases with symptoms typical of cervical rib, but with no cervical rib demonstrable by X-ray, and had examined the literature of cervical ribs for a possible explanation. It was found that a number of observers, more especially British surgeons, had some time previously observed this fact, and had worked out the anatomy. A number of American diagnosticians have accepted their findings and are referring such cases for surgical treatment. As far back as 1850 English literature contains descriptions of atypical symptoms usually attributed to cervical ribs. Symptoms have been found where the brachial plexus or subclavian artery, or both, have been carried over either a fibrous or a fibro-cartilaginous band. This band may extend between the proximal and distal bony portion of the cervical rib, or may connect a very short rib extending no farther than the tip of the transverse process to the first dorsal rib. This fibrous band consists at times of fibrous tissue or cartilage, or mixtures of cartilage and bone. It has become accepted practice in London to operate for the removal of this connecting substance where the symptoms of pressure have been present, even though no cervical rib is demonstrated by X-ray.

Dr. Davis reported two such cases, and mentioned two others which had occurred in the practice of other surgeons.

Dr. George W. Hall said that Dr. Davis mentioned one point in connection with the case that had been under Dr. Gill's treatment, namely, the eye symptoms, which the speaker considered of importance. As the cervical rib catches the lower portion of the brachial plexus and catches the sympathetic fibers which run to the eye, it causes the definite eye symptoms referred to. Dr. Hall had reported a case of this kind, which was operated by Dr. Kanavel, followed by complete recovery. He had also observed this eye condition in other brachial plexus regions. He thought it was a very interesting symptom, and he was glad the Doctor had brought it out in his paper.

Dr. Bayard Holmes said that if the cervical sympathetic is impinged on, it might be possible that it would give the paradox of Schultz, which is an adrenalin mydriasis. If the superior cervical sympathetic is injured and adrenalin is then instilled into the eye upon that side, in about four or five minutes you will notice that the pupil on the side on which the cervical sympathetic is injured and the adrenalin instilled will be widely dilated, and that is the same whether the pupil is found contracted from the irritation of the cervical sympathetic or not. It appears in a great proportion of the cases of dementia præcox, and in cases of gastric crisis where the Argyll-Robertson pupil has not already become fixed.

REPORT OF THREE CASES OF HEMIANOPSIA WITH NECROPSY

By Peter Bassoe, M.D., and B. O. Raulston, M.D.

CASE I. A man thirty-two years old, a plumber by occupation, was admitted to the Presbyterian Hospital in the service of Dr. Bassoe, on March 13, 1915. He had been a heavy whiskey drinker for years. In August, 1914, he began to have epileptiform attacks with unconsciousness, general rigidity and sometimes convulsions. He also had attacks of dizziness and of mere confusion. In February, 1915, he developed severe headache over the cortex and occiput, more on the left side. Along with the headache increasing mental dullness was observed. He gave a history of gonorrhea but denied syphilis. The neurological examination was negative except for right hemianopsia. The Wassermann test with blood and spinal fluid and the Nonne and Lange tests with the latter were negative; no increase in cells. Examination of the blood showed 4,940,000 red cells, 11,250 white cells and 76 per cent. hemoglobin. Urine normal. Blood pressure, systolic, 138; diastolic, 82. The patient seemed to have severe headache, rapidly became stuporous and finally comatose. There was no fever and the pulse rate ranged from 80 down to 48. He died on March 16, 1915.

At the necropsy the brain was found to be dry, with flattened convolutions. The sella turcica was wide but probably within normal limits, as the head was very brachycephalic.

The dura showed no change. A slightly bulging growth was noted on the external surface of the left parietal lobe, in the region of the angular gyrus. After hardening in formalin frontal sections were made. The tumor mentioned was found to extend posteriorly, infiltrating cortex and white matter and constituting a fairly well defined tumor nodule 3 cm. long, 2 cm. wide and 2 cm. deep. The tumor was light grayish and had no capsule anywhere. Another tumor of similar appearance occupied the mesial and most anterior portion of the occipital lobe and extended forward in the parietal lobe as far as the level of the anterior end of the pons. It terminated in the centrum ovale about 1 cm. above the lateral ventricle and 2 cm. to the left of the median line. It showed considerable degeneration in places. Its greatest dimensions were 3×2 cm., in the posterior part of the parietal lobe. Histologic examination showed glioma.

CASE II. A man, fifty-five years old, was first seen by Dr. Bassoe on August 5, 1915. He gave no history of venereal disease and no other previous disease of importance, having merely had a few attacks of "grippe" and lumbago and had been subject to headaches since youth. He was a printer and early in 1915 he noticed that he had some difficulty in locating the boxes of type and particularly that he did not seem to see so well to the left, so he frequently would omit the first letter of a word. When reading whole words would sometimes seem replaced by blank spaces. In February he consulted Dr. W. H. Wilder, who gave the information that there was no marked contraction of the fields, but a scotoma was present. With correction vision was 20/20. The fundi were normal except for arteriosclerotic changes. At this time he also developed nearly constant headache, chiefly in the right frontal region. This gradually grew more severe and kept him awake nights. By the middle of March weakness and clumsiness in the left arm and leg became apparent and gradually increased. In July vomiting became frequent. In April there was retention of urine for a few days and the prostate gland was found to be enlarged. A Wassermann test with the blood at this time was negative. From April on incontinence of urine and feces was the rule; he became forgetful and at times confused. No convulsions or speech disturbance at any time. The chief findings were: left hemianopsia and partial

left hemiplegia; the left abdominal reflex was absent, right present; both knee jerks were increased; ankle and plantar reflexes equal and normal. The patient came to the Presbyterian Hospital on August 9. Examination of the eyes by Dr. C. G. Darling revealed marked bilateral papillitis, swelling of left disc 4 D., right disc 2 D. R. V. 20 25-3; L. V. 20 20-2. Blood pressure 125. Wassermann test with the blood negative, with spinal fluid positive. The latter gave a strongly positive Nonne-Apelt test and cytologic examination revealed thirty-three large mononuclear cells and eight lymphocytes per cubic millimeter. The Lange gold test gave a reaction as follows: (Maximum reaction recorded as 5) 0, 0, 0, 1, 2, 2, 2, 1, 0, 0. This reaction is both too weak and too far to the right to be suggestive of syphilis. The urine contained a trace of albumin, occasional granular casts and leukocytes. The patient rapidly grew worse and examination of sensation could not be made. He vomited very frequently and later developed hiccough. The last four days of his life the temperature gradually rose, reaching 106.4° just before death on August 16.

Only the brain was examined post mortem, and the following record was made:

The dura over the right occipital lobe on its outer surface and at the pole was adherent and slightly thickened. It could be readily separated without tearing the pia arachnoid. The latter had a peculiar puckered appearance with only slight thickening but obliteration of the normal surface markings over the occipital pole and the external surface of the occipital lobe and adjacent part of the temporal lobe. On section a tumor growth was found to extend from the occipital pole forward to within 4 cm. of the tip of the temporal lobe. The greatest width of the tumor was 2 cm. in front of the occipital pole, where it measured 5 by 6 cm., and occupied the external and inferior two thirds of the vertical section. The lowest part of the mesial surface was involved for a distance of 3 cm. from the pole. The calcarine fissure was involved only at its extreme posterior end. The tumor gradually tapered anteriorly and remained close to the external surface. It was distinctly infiltrating and was the seat of several hemorrhages, the largest of which was near the anterior end and measured 20 by 5 mm. The posterior horn of the lateral ventricle was collapsed on the right side. Histologic examination showed the tumor to be a papillary carcinoma, hence metastatic. The primary site was doubtful, possibly the prostate.

CASE III. A man thirty-five years old was admitted to the service of Dr. Herrick in the Presbyterian Hospital on April 27, 1915. He had used considerable alcohol for the last six years. Seven weeks before admittance he began to complain of pain and coldness in the left foot, which gradually grew worse. About a week before admittance he became dizzy and discovered that he could not read. The same evening he had severe abdominal pain, nausea, vomiting, and his whole right side became very weak. His speech was also affected, but improved until a few days later he suddenly became entirely unable to talk for four hours, after which he again improved. The chief findings on examination were: The right pupil reacted sluggishly to light and was larger than the left, which reacted normally. Right homonymous hemianopsia. Ophthalmoscopic examination negative. Partial right hemiplegia; tendon reflexes increased on right side; plantar normal. Tremor and incoördination in right arm. Tactile sensation normal but entire right side appeared hyperalgesic. He could not name common objects and did not recognize letters; he could repeat four or five numbers, but not six. He seemed to understand what was said to him. Examination of the heart was negative. Tender, firm swelling of right testicle. The Wassermann test was positive with both blood and spinal fluid; the latter contained eleven cells per cubic millimeter, gave a positive Nonne test and

a weak Lange gold test with the maximum reaction in the dilutions of 1:160 and 1:320. The blood pressure was: systolic 114, diastolic 90. The left foot became more painful, cold and pale; the pulse in the dorsal artery disappeared and finally the big toe became gangrenous and was amputated on June 8 by Dr. Dean Lewis. His aphasia improved a little but the hemianopsia remained unchanged. Pain in the left foot persisted. He was given mercury and several doses of neosalvarsan intravenously. On July 26 he suddenly began to gasp for breath and frothed at the mouth; the face became very pale, the extremities cold and moist and the respirations labored. Fifteen minutes later he died.

The chief post-mortem findings were: Bilateral pulmonary emboli with hemorrhagic infarcts; syphilitic aortitis; miliary gummata of spleen; gumma of right testicle; thrombosis of the left iliac artery, infarcts of kidneys, chronic nephritis; softening in right occipital and temporal lobes; edema of brain.

The left occipital lobe showed marked atrophy both at the pole and on the mesial and the external surfaces, both of which showed deeply sunken areas. Frontal sections showed extensive softening involving the cortex and subcortical white matter in the mesial, inferior and external portions. The softening in the calcarine region extended inward to the ependyma of the posterior horn. The softening in the mesial portion extended forward into the parietal lobe as far as the posterior end of the corpus callosum, while that external to the ventricle extended forward to the insular region. At the level of the posterior commissure was a separate area of softening involving the left thalamus. In the left side of the pons was a recent circular hemorrhage 4 mm. in diameter.

Dr. Hugh T. Patrick asked Dr. Bassoe whether, in the second case, the occurrence of those very large cells in the spinal fluid would help to make a diagnosis of malignant growth. That was a new finding to the speaker. There was a very large discrepancy between the lymphocytes and these cells. The cases reported had interested Dr. Patrick a great deal, because he has seen the same type of cases, with the exception of the malignant disease. The first well-marked case of occipital tumor that he ever saw simulated for a time ophthalmic migraine—severe headache coming on periodically, with scintillating scotoma of hemiopic distribution. The patient had these attacks for some time before showing any positive signs of tumor—before he showed any hemianopsia at all, although when Dr. Patrick first saw him he suspected a tumor, but was not willing to make that diagnosis until the patient developed some hemianopsia, which showed itself first for colors. The patient was operated upon and the tumor removed, but not entirely, and the man died suddenly some time afterwards, as tumor cases do, after going back to work.

Dr. Patrick thought some of the vascular cases are exceedingly interesting, and he would like to know whether any of the members had observed or thought they observed, as he thought he had, that people who have been migrainous for many years, and then reach old age, with arterial changes, often show these scintillating scotomas, probably due to vascular change. It may seem rather far-fetched, but the idea has occurred to him in several of these cases that a patient having already the migraine tendency (and we know that sometimes a migraine voices itself without any pain at all, but only a scintillating scotoma), when he reaches the age of vascular change, seems to have this migrainous tendency accentuated by the arterial change, and then sometimes has these scintillating scotomas frequently; that is, in attacks which last for a long time, and become more frequent. In some of these cases the scotomas have been of a peculiar distribution. One case he remembered especially, that of an old lady who had a horizontal scintillating

scotoma of the lower field. She described the sensation during the attack as though she were walking through water that showed all the colors of the rainbow and a sparkling effect as if it were made up of millions of precious stones, this being of an inferior hemiopic distribution.

Dr. Julius Grinker recalled a case on his service at the Cook County Hospital which he had diagnosed as encephalomalacia of the occipital lobe. The patient, a young man, entered the hospital in a peculiar apathetic condition, and could give no history. When the speaker first saw him he was constantly looking towards one side—he was suffering from hemianopsia, as was subsequently verified by various tests. That young man had syphilis, and it was evident that he had an encephalomalacia, softening due to a thrombus. The only other symptom was a headache, which preceded the development of this condition. The eye findings were negative. A positive history of lues was elicited. The speaker was in hopes that he might have an autopsy on this case to verify his diagnosis, but under antisiphilitic treatment the patient improved in every other way, except for the hemianopsia. This did not change in the least, and was to him another proof that the softening was beyond repair.

Dr. Bassoe said he had not seen any of the scintillating scotomas in arteriosclerotics as spoken of by Dr. Patrick. However, there is a combination which he has seen so many times that he hopes to report on it to the Society, namely, cases of life-long migraine in which meningeal and cerebral hemorrhage occurred later, sometimes with and sometimes without marked arteriosclerosis. He cannot help but believe that there is some connection, although migraine is very frequent and so is cerebral hemorrhage. He showed some specimens to the Chicago Pathological Society seven years ago, in which there were meningeal, retinal and cerebral hemorrhages at the same time. He has also had occasion to make lumbar punctures in a few cases, where the patient seemed to get a severe attack of migraine, just like a hundred previous attacks, but the attacks lasted longer than usual, and became very severe, sometimes with a partial clouding of consciousness. In two recent cases he has made a lumbar puncture and got a strongly hemoglobin-stained fluid. One of these cases got entirely well from this attack, and was just as before; another, during the attack, lost the vision of one eye entirely, and had an optic neuritis in the other eye. The loss of vision was due to vitreous hemorrhage. The optic neuritis cleared up completely, so that the eye is perfectly normal now. That patient who did have a high blood pressure was a woman, only a little over forty, whom one would not consider arteriosclerotic. He cannot help but think that the migraine had something to do with the hemorrhage in that case.

CHICAGO NEUROLOGICAL SOCIETY IN JOINT MEETING WITH THE CHICAGO MEDICAL SOCIETY

MARCH 15, 1916

THE NEWER CONCEPTS OF THE NEUROSES: AN ESTIMATE OF THEIR CLINICAL VALUE

By Sidney I. Schwab, M.D.

This paper took up the question of the neuroses from the standpoint of the various theories which have been advanced to explain them, and considered the theories from the point of their effectiveness in the understanding and practical methods of treating them.

The questions that the speaker has tried to answer are:

First, what are the really important theories which cluster around the attempt to explain the neuroses?

Second, of what use are they?

Third, what remains after the untrue and useless are set aside?

A definition of neuroses was advanced, which had to do with their primary psychogenic origin and manifestation, with an explanation of the objective symptoms which they present and their lack of relationship to known physiological functions or the law of anatomical distribution, and which considered the factors of intelligence and conduct. As a result of this definition three general facts concerning the neuroses might be stated. First, that a rigid classification is impossible. Second, that pure types are rare. Third, that certain of the neuroses deal chiefly with phenomena that are conscious and certain others with phenomena that are unconscious.

Following this definition five types of neuroses are to be considered: the first three of which are conscious phenomena, and the last two being unconscious. Of the conscious types there is, first, neurasthenia; second, hypochondrosis; and third, psychasthenia. To a consideration of these conditions the patient can bring his intelligence, and his experience, and his insight. Fourth, hysteria; and fifth, the compulsion neuroses.

Each of these five types is defined from the standpoint of their origin and manifestations. Toward the orientation of these various types of neuroses four important sets of hypothesis have been adduced. They are in the order of their importance:

First, Freudian.

Second, the Janet theory of disassociation of consciousness.

Third, the Babinski group of ideas.

Fourth, the theory of congenital or acquired inadequacy.

Each of these four theories is described and their difficulties and advantages are critically considered, always from the point of view of their practical utility in actual experience.

In regard to the Freudian psychology it was pointed out that there were three prime obstacles that stand in the way of its more universal use. First, the uncertain character of what constitutes the essential facts. Second, the ever changing conception of what is meant by its central idea, and, thirdly, the technical difficulties which the procedure of psychoanalysis carries with it.

Of the Janet theory it was believed that it was particularly adapted to rarer types of hysteria and to such hysterical affections which relate to the complicated mechanism of the special senses in which the dissociation is so obvious that the therapeutic effort at synthesis is unmistakably set out. The clinical application of the Babinski conception is less easily demonstrable, because it is a sort of formula and not an attempt at psychological analysis.

The theory of inadequacy finds its chief value in presenting a positive scheme both for the understanding of the condition presented and making for a definite plan of therapy.

Three cases were briefly related in this paper to illustrate some of the questions which were brought out.

Case I had to do with a condition commonly called kleptomania.

Case II concerns an obsession type of the compulsion neuroses.

Case III is a contamination type of phobia.

The following conclusions were set down:

There is, therefore, open to the choice of the investigator or therapist of the neuroses the following ideas, some of which are capable of being used in the daily work of the neurologists and those who have occasion to treat the neuroses, and all of which have proven their worth by the test of actual experience.

First, the general admission that a psychologically intricate disease is to be treated by a psychologically planned theory.

Second, no psychological system or device contains more than a portion of the truth.

Third, therefore, it is justifiable to select as much of the truth out of any one system as seems worth while.

Fourth, psychoanalysis in the Freudian sense offers at the present time the most promising method of investigating and treating the neuroses.

Fifth, the root notion of the Freudian psychology, that of sexuality, is to be regarded in the light of a hypothesis rather than a proven fact. The ideas associated with the terms repression, wish-fulfillment, infantile traumata, dream interpretation among the Freudian concepts are of practical everyday use.

Sixth, as a working theory towards the explanation of hysteria and as providing a method of treatment of certain types of hysteria the Janet theory of dissociation of consciousness is useful upon which to base synthetic therapy. In a negative way the Babinski idea of hysteria should constantly be kept in mind. The theory of inadequacy furnishes to the physician a broad scheme of approach to many forms of the neuroses.

These seem, therefore, to furnish a broad general structure upon which ideas of the causation and mechanism of the neuroses and direct therapeutic attempts upon the neuroses may be based.

These are things, pragmatically speaking, which the newer concepts of the neuroses have brought to strengthen the hands of the neurological therapist.

Dr. Hugh T. Patrick said he would like Dr. Schwab to state a little more fully the distinction of psychasthenia from the compulsion neurosis. There seem to be some cases of psychasthenia in which fear is the basic emotion producing the manifestations, the cases taking the form of a compulsion neurosis. That is, there is a compulsion caused by fear, the patient being entirely ignorant of the fear. He cannot do certain things or he must do certain things. The reason is the presence of a perfectly definite fear of which the patient is unconscious. There are many such cases.

He thoroughly agreed with Dr. Schwab that we are indebted to psychoanalysis for one thing; namely, it had taught us to take better histories of our cases, to become better acquainted with our patients and with the things which influenced them. We have learned better than formerly that a lot of things that help to make up the present symptom complex date back early in the experiences of the patient. Again, it had taught us that the patient's troubles, his complaints, his inabilities may be due largely to influences which he has forgotten. As confirming what had been said, he cited the following case: A young married woman was sent to him for vaginismus. Intercourse was absolutely impossible. There was no organic obstacle. She had no prudish notions about intercourse and was sincerely anxious to fulfill her duties as a wife. She had had no horrible tales told her about the discomforts of the first sexual act. She had never been operated on nor had any of her friends. This condition was not in any way connected with any tale she had heard or read. The vaginismus was not particularly painful, but not only was the marital act exceedingly distasteful and caused a revulsion of feeling which she could not overcome, but even when her husband touched her breasts there was a great revulsion of feeling, an instinctive defense which she did not understand and could not overcome. After numerous inquiries, he finally asked her whether she had ever seen any distressing pictures relating to the breasts and she then recalled that she had. When she was thirteen years of age she had visited a picture gallery in Europe and had seen pictures of women having their breasts slashed, burned, etc., and this

sight produced a profound impression upon her. At about this time, too, her mother had talked to her and her sister seriously and emphatically about the horrors and terrible consequences of masturbation. Those two things made a powerful impression upon that impressionable girl; but in the course of time they passed out of her mind. When she came to be married the result was that she was unable to carry on the sexual act. But the cause of the trouble having been brought to light, the cure was relatively easy.

Dr. Patrick also agreed with the essayist that in some cases psychoanalysis relieved not because it gave the true explanation of the symptoms but because the patient thought it did. It took his disorder out of the realm of mystery into that of natural phenomena. This applies also to many other therapeutic procedures.

Dr. Lewis J. Pollock said a manager of a road show consulted him for a number of phobias, obsessions and fixed ideas. On account of his fears of death, insanity, suicide, etc., his impulses to question and orient himself, he was in a pitiable state and was unable to conduct his business. He told Dr. Pollock that he had spent a number of months with one of the greatest exponents of the Freudian theory in America. During the psychoanalysis, which had lasted a considerable number of months, the *Œdipus complex* and anal eroticism were clearly demonstrated and the patient found and accepted a clear explanation for his various fears and doubts which were only subterfuges to escape responsibility so that he might go to the shelter of his mother, etc. He professed a wide knowledge of the method of psychoanalysis and was familiar enough with the psychoanalyst to know that his case had been recorded in some of the physician's publications. Although a number of months had been occupied in unearthing the complexes responsible for his condition and although they apparently were found to the satisfaction of the patient and probably of the physician, the patient was at least as badly afflicted as ever. The patient remarked, "It is sometimes surprising to me, after I have understood myself so well, why I am not fully cured; and if I have not been analyzed sufficiently, must I look forward to a life in which I will have to be continuously psychoanalyzed?"

The thought occurred to Dr. Pollock that, instead of curing the man of his obsessions, fears and impulses, there was added to the fears and impulses that were autogenous, a fear that would never leave him.

Having implicit confidence in the psychoanalyst and believing firmly in the Freudian theory of the mechanism of the compulsion neuroses, it remained only for him to realize that he was not cured and so not sufficiently psychoanalyzed to form the basis of the despair which each little doubt, fear or incapacity must lead to.

Dr. L. Harrison Mettler said that while he might be wrong from the Freudian point of view, nevertheless he thought there was a great deal of expenditure of unnecessary labor and effort to make profound psychologically what had long been known to the human race, but seemingly impossible in the simpler way of putting things. It appeared to him that psychoanalysis was nothing but a reiteration of commonplace knowledge, commonplace facts, and under the broad term we spoke of it as discipline or training. If people are weak, we strengthen them. If they have these erroneous suggestions or conceptions, we correct them. Parents and school teachers are correcting these things right along. They are working upon mentalities that are not strong and adequate and cannot work out their own salvation.

Symbols and symbolism are not things to be labored over and looked upon as a new discovery, and so it seemed to him that practitioners were expending a lot of energy in trying to render scientific what underlies the facts of a simple training we would give to children and grown up people.

SOME OF THE MODERN VIEWS OF SYPHILIS OF THE
NERVOUS SYSTEM

By Archibald Church, M.D.

The speaker pointed out the history of the discovery of the syphilitic origin of locomotor ataxia and general paresis, as first contended by Fournier, then supported by Erb, and subsequently confirmed by Schaudin, Wassermann, Noguchi, Moore and others. He advised that the terms *parasyphilis* and *metasyphilis* should be entirely discarded, that these late forms of syphilis should be recognized as being true syphilitic processes.

He called attention to the uniform findings in the cerebrospinal fluid in these conditions and their great importance, not only in the diagnosis but in watching the course of treatment.

In reference to the prevalence of syphilis, he referred at some length to the report of Vedder, issued by the Surgeon General, indicating that among accepted recruits nearly 17 per cent were syphilitic, as shown by carefully made Wassermann tests.

He called attention to the findings of Finger, Hoffmann, Nichols, Steiner and others, of the presence of syphilitic changes in the cerebrospinal fluid in over 80 per cent. of cases of syphilis in the primary and secondary stages, and the probability that the cerebrospinal fluid is early modified in every case of syphilis. In short, that every case of syphilis is to be considered a case of nervous syphilis almost from the first day. That the ectodermal relations of the neural apparatus and the skin would favor this association in a disease that particularly invades cutaneous structures.

He called attention to the extensive clinical field of nervous syphilis which has only been opened to investigation through the more recent serological tests, and to the fact that very many minor complaints and even evidences of serious physical illness can be readily mistaken for syphilis in such cases, only to be unmasked by the proper laboratory investigations.

As to the frequency of *tabes* and general paresis, he called particular attention to the report of Mattuschek and Pilcz, based upon the completed histories of over four thousand Austrian officers after an elapsed period of twenty-two years, showing that of this large number 6.26 per cent. had developed either one or both of these diseases, and that over 20 per cent. of this number had either lost their lives or had them materially shortened by the invasions of the disease.

He dwelt at some length on the variations of the syphilitic organism as showing itself at different periods of clinical histories, and peculiarities of certain clinical histories, as for instance in conjugal cases of *tabes*, optic atrophy, and general paresis, and indicated that the mild type of syphilis found in married women might be perhaps correlated with the fact that they were infected by a modified spirochete.

He detailed certain clinical observations where a number of individuals had been syphilized from the same source and developed the same clinical character of syphilis. In some such instances the late manifestations of syphilis in the form of general paresis had been the uniform result.

Variations of the organism *in vitro* were also detailed, and the experiments of Noguchi, Graves and others with the spirochetes obtained from general paresis as distinguishing them from the spirochetes of early syphilis were mentioned.

He referred to a personal communication in reference to the strains of syphilitic organisms propagated in the laboratory of the Army Medical School at Washington as a confirmatory and interesting feature and of clinical application.

In reference to the treatment of late syphilis in the form of tabes and general paresis, he admitted that all of the modern methods, the newer remedies, and their administration by intracranial and intraspinal procedures, were still incapable of controlling the progress of the disease. He expressed the opinion that the problem was not so much the discovery of the means or mode of administration as of finding a remedy which should be capable of meeting the spirochete in its modified and immunized form as present in the late syphilis of these brain and cord lesions.

SELECTED CHAPTERS ON THE TREATMENT OF NERVOUS DISEASES

By Julius Grinker, M.D.

The speaker discussed the surgical treatment of epilepsy, brain and spinal cord tumors. He criticized the let-alone tendency of most physicians when they encounter epilepsy of traumatic origin not of recent date. Quoting Tilman's experience, who operated on twenty cases of traumatic epilepsy with indefinite signs of trauma, of which number he found only one without evidences of injury to the brain or its membranes, he advocated more frequent operation on the brains of epileptics, provided there are present some of the signs and symptoms of traumatic epilepsy. In conformity with this view Dr. Grinker urged a most careful examination of each epileptic for unilateral symptoms, both as to onset of attacks, as well as to the existence of slight paralytic signs.

In his remarks on brain and spinal cord tumor he strongly advocated decompression operation in every case of intracranial pressure giving rise to the symptoms of choked disc, headache, nausea and vomiting, vertigo, slow pulse and convulsions. With Horsley he characterized the so-called "expectant" treatment of brain tumor as a barbarous procedure. To wait for focal signs, enabling a localizing diagnosis to be made, usually means the loss of vision, which is often worse than death. Because of the ease with which spinal growths can be localized, operation of the spinal cord should be undertaken more frequently—not only for radical, but also for palliative treatment. This course may all the more readily be urged, since only a moderately skilled surgeon may do a successful laminectomy, when the same surgeon finds himself lost in the cranial cavity.

Translations

VEGETATIVE NEUROLOGY, THE ANATOMY, PHYSIOLOGY, PHARMODYNAMICS AND PATHOLOGY OF THE SYMPATHETIC AND AUTONOMIC SYSTEM

BY HEINRICH HIGIER,

WARSAW

Authorized Translation by Walter Max Kraus, A.M., M.D.
[New York].

(Continued from page 180)

Any attempt to obtain the ordinary reflex salivation in a dog with a salivary fistula whose cortical centers for salivation have been removed is successful. Stimuli of taste and smell always give a profuse reflex salivation. But the psychoreflex is absent. Showing the dog food in a closed glass vessel, placing odorless food before him, rattling plates or other dishes provoke no reflex salivation.

There is also supposed to be a cortical center for gastric secretion whose absence prevents the occurrence of psychogenic gastric juice due to the stimulation of food not yet eaten. The other gastric reactions remain unaltered.

Experimentation with lactating sheep has shown a cortical center for milk production in the frontal lobes. After these centers have been bilaterally removed, the sheep does not nurse its lamb either upon seeing it or hearing it cry. This she would do before the operation.

These experiments were subsequently elaborated and modified. Where at first the salivation appeared only on seeing food and simultaneous sensory stimulation of a quite different nature, later the sensory stimulation sufficed to bring about the reflex stimulation (artificial association reflex). Such sensory stimuli are sticking the leg, cooling the chest, smelling musk, the sound of the note C, etc.

Bechterew concluded from the above and similar experiments upon the cortex cerebri that visceral tracts, motor and secretory,

have a central cortical representation. Pawlow reached conclusions based upon what he calls natural and artificial association reflexes, which are diametrically opposed to those of Bechterew. These opposite conclusions were based on the observations that the absence of psychoreflexes was but transitory and shortlived.

L. Müller is also skeptical as to the validity of the above experiments. In his opinion neither physiology, histology nor pathology has given us any definite basis for believing that there are cortical centers for internal organs.

Faradic stimulation of the cerebral cortex causes mydriasis, salivation, intestinal inhibition, etc., for the same reason that stimulation of a sensory nerve will produce these results in the vegetative nervous system. There are neither cortical centers nor sympathetic spinal cord tracts. External skin structures (vasomotor muscle, pilomotor muscle and sweat glands) and the internal viscera receive so many fibers from the rami communicantes of the spinal cord metameres—there are over forty—"that the visceral tracts, if they did pass in the lateral columns of the spinal cord would take up considerable room."

The fact which is taken as proof of the existence of a vegetative cerebrospinal tract is the transitory suspension of the vasomotor reflex in complete transverse section of the spinal cord. This may be explained in the same way as the transitory suspension of the tendon reflexes and of the sphincter reflexes under the same circumstances, the explanation being a sudden fall in the tonic influences upon the spinal cord.

"If," says Müller, "we assume a center in the cortex for vasomotors, we must assume one also for the heart, stomach and intestines, and not only for their musculature but also for their glands, also for the genital organs, salivary glands, sweat glands and piloerectors, for all of these organs as well as the vasomotors are influenced by this or that change in emotional activity."

II. How may the effect of emotions upon the vegetative nervous system be explained in view of what has just been said about psychovegetative cortical centers? The physiologic effect of emotions is demonstrated every day. Blushing in shame, pallor, mydriasis and increased peristalsis in fright, tears in sorrow, gasping breathing in anger, palpitation in joy, sweating in anxiety, goose-flesh in fear, salivation resulting from appetite, urgency of urination in restless waiting, increase of sexual potency during good humor and diminution during bad humor, etc.

In the state of satisfaction the psychic reflex does not take place.

Appetizing odors of food do not call forth salivation, nor do adequate stimuli bring forth sexual desire or erection, nor does a pistol shot accelerate the heart rate or bring forth sweat. The emotion as a product of a corresponding association is not physiologically produced under conditions of satisfaction.

The bodily manifestations of psychic occurrences are so constant in the vegetative domain that they have been used as precise measures in psychophysiological studies. The following reactions have been used: (*a*) Measurement of the pupil (Bunke), (*b*) measurement of the activity of the salivary glands (Pawlow), (*c*) measurement of the involuntary activity of the bladder (Mosso), (*d*) measurement of the skin resistance during various degrees of sweating (Veraguth's psychogalvanic reflex phenomenon), (*e*) measurement of the activity of the vasomotors and the heart (Mosso-Lehmann plethysmographic test of blood distribution).

The somatic manifestations of psychic occurrences are also of great significance in the consideration of psychophysical parallelism, a theoretical postulate which has received much attention in the modern study of brain physiology and psychology.

III. How may the influence of higher intellectual activities and emotions upon vegetative functions be explained?

The normal equilibrium of all centrifugal impulses, while it is constant, shows, according to H. Nusbaum, a correspondence to the state of our consciousness as well as to our objective appreciation of our own state. When the normal balance of centrifugal impulses is disturbed, something unusual has occurred and presents itself to our Ego as such and gives us the objective picture of a change of feeling. Thanks to the centripetal nerves, the physiological condition of our organs is carried to those nerve centers which maintain a normal centripetal equilibrium. This balance of impulses as a constant, unchanging, normal relation does not enter consciousness but at most gives a vague feeling of its presence. "Only a change in this equilibrium stimulates consciousness and leads to excitation of the subjective element which we speak of as the feelings."

L. Müller proposes a very similar viewpoint which also quite denies any anatomical representation of the vegetative nervous system in the cerebral cortex or in centrifugal spinal tracts. He maintains that the biotonus or bioelectrical state of the brain and spinal cord undergoes a change when bodily pain, emotions or mental processes accompany a change in the feelings (the voluntary impulse, activity due to attention or to the act of representation).

"Just as a barometer registers changes in air pressure which we cannot perceive, so do minute changes in volume of the blood in the vessels and the diameter of the pupil give indications of changes in the central nervous system which are in the main not perceived."

These delicate organs of precision are comparable to the objective of a microscope which magnifies the size of an object or to the multiplier of a galvanometer which magnifies the minute deviation of the magnetic needle.

The variations in biotonus show changes not only in the vegetative nervous system, but also in the psychomotor system (change of the intensity of the tendon reflex in attention, characteristic activities and thoughts in joy and depression).

It is also worthy of note that ganglion cells of various organs react to various kinds of emotional stimulation, tears in sorrow (ganglion lacrimale), heart ganglion in fright. Just as laughter brings the ganglion cells dominating certain facial muscles, the diaphragm and the vocal cords into activity without there being a laughter center, so do the by-effects of various emotional states bring about changes in various groups of the visceral ganglion cells of the midbrain, medulla and spinal cord. The visceral system, particularly the eye and facial blood vessels, may be regarded as a mirror of the soul upon which each psychic change is reflected.

The varying tonus of the vegetative nervous system dominated by external and internal influences is subject to some laws which all psychologists are agreed upon. In old age and in extreme fatigue the projection of psychic activities upon the vegetative nervous system is diminished—sluggish pupil, diminished potency, mild blushing, slow warming and sweating of the skin. "It is hard to say in how far diminished activity of the emotions on one hand or diminished reactivity of the vegetative nervous system on the other are responsible. Probably both factors play a part" (Möller).

Further mention will be made of the interesting relations of psychic activities to vegetative activities in the chapter dealing with the relations of the glands of internal secretion and the vegetative nervous system.

IX. PHARMACOLOGY AND PHARMACODYNAMICS OF THE VEGETATIVE SYSTEM

Many factors enter into the maintenance of the activity of the vegetative nervous system. There are not only, as we have seen in the section on physiology, primary sensory stimuli from the periphery, and secondary stimuli through the feelings and the mental

events taking place in the cerebrum, but also stimuli derived from a variety of chemical substances. These stimulate the vegetative system without affecting the cerebrospinal system, and may be classified:

I. As pharmacological preparations, or drugs.

II. As products of internal secretion, or hormones.

At this point the antagonism between the innervations of the sympathetic and autonomic systems, as briefly described above, becomes very important. One may justly conclude from the remarkable fact of the selective influence upon one or the other system, of the above named classes of substances, that the cells of origin, and the peripheral endings of the mesencephalic, bulbar and sacral autonomic fibers differ essentially in their chemical affinity from those in the sympathetic system. We shall commence with a discussion of the exogenous substances, considered in connection with the fundamental experiments of the Vienna School, with the exhaustive pharmacological review of Fröblich, the classical work of Biedl upon internal secretions and the control experiments of Petré and Thorling, Bauer and Asehner. Later, we shall consider the endogenous substances or "hormones."

I. The first place among exogenous substances belongs to nicotine. This drug has played an exceedingly important rôle in the history of the physiology of the sympathetic nervous system. Pharmacological experiments with it have yielded valuable and fundamental insight into the anatomical structure of the vegetative system. For this we are indebted to the fundamental experiments of Langley and Dickenson. They have taught us that the paths of vegetative nerves are not interrupted as are those of the motor nerves to voluntary muscle, but that the interpolation of a single ganglion cell makes a division into two neurones, and that this division or interruption, the synapse, marks the transition between preganglionic and postganglionic segments. After intravenous injection of nicotine, or after brushing the ganglion with the alkaloid: stimulation which is precellular, or central to the synapse, is without action, while stimulation peripheral to the synapse, or retrocellular, that is of the second neurone, beginning in the aforementioned ganglion cell, and ending in some organ, does give a reaction. It is obvious that by means of a one per cent. nicotine solution one may also determine the place of interruption in those cases in which the sympathetic fibers pass through several ganglia, and are only interrupted in one of them. For example, the pupilo-dilator fibers, which go through two ganglia, to be finally inter-

rupted in the superior cervical ganglion, and the nerves to the intestine, which pass through several ganglia, before being interrupted in the celiac ganglion.

Nicotine in strong concentration at first stimulates, later paralyzes. At first it acts upon the vasomotor and the sweat glands, and thereafter upon all the vegetative organs. During smoking the stimulating effect is in the foreground, and it is only exceptionally that human beings are severely poisoned by nicotine with the subsequent paralysis of the medullary-respiratory center, and of the vasomotor center, an effect which is readily obtained in animals. We may speak of nicotine as a vegetative katexotic poison, which influences all the ganglion cells of this system, both sympathetic and autonomic. On the other hand, the other, better known alkaloids, and the products of internal secretion act exclusively on one system, whose tone they alter, that is to say, they are either sympathicotonic, or autonomotonic. Since the autonomic system is mainly represented by the vagus, we speak of the last named group of substances as "vagotonic" substances.

A. The exogenous substances which are of a vagotonic or vagotrophic nature, *i. e.*, substances which affect the activity of the mesencephalic bulbar and sacral divisions of the autonomic system, include

1. Poisons which paralyze the autonomic nerve endings, vago-paralysants; atropin and the nitrites. Atropin paralyzes the accelerator nerves (mydriasis, inhibition of sweating). Nitrites paralyze the inhibitory nerves (vasodilators of the *N. erigens*).

2. Poisons which stimulate the autonomic nerve endings, vago-spastics; muscarin, pilocarpin, picrotoxin, and physostygmine. The last mentioned is distinguished from the others by the fact that its action is less a stimulating one, and more one of raising the threshold of the sensitivity of the nerves. The physiologico-pharmacological manifestations of the action of these substances is decrease in blood pressure, weakening of cardiac action, bradycardia, narrowing of the pupil, increased glandular secretion, and spastic peristalsis in the gastro-intestinal tract.

It is noteworthy that it is only exceptionally that a substance has a universal action upon the autonomic system. Most of them have a selective action. Atropin has a powerful influence upon the cranial branches, little upon the sacral branches, while the nitrates influence the latter in the main, but not the former.

Pilocarpin has a strong selective action upon the secretory fibers, while muscarin affects the cardiac fibers. We see the same kind

of activity among the sympathicotonic poisons. The teleological significance of the two nervous systems obviously lies in the fact that they act antagonistically. So it is comprehensible, as the accompanying table by Fröhlich bears out, that, as is the case with nervous stimulation, so it is with the chemical stimulants affecting corresponding parts. They have an antagonistic action upon one another.

TABLE

	Central Stimulant	Peripheral Stimulants		Peripheral Paralysants		Augmenters of the Peripheral Irritability
		Accelerator	Inhibitor	Accelerator	Inhibitor	
Autonomic	Picrotoxin	Pilocarpin Cholin		Atropin	Nitrites	Physostygm- in
Sympa- thetic	Beta-tetra- hydronaph- thylamin	Adrenalin	Adrenalin	Ergotoxin		Cocaine

B. Among the exogenous substances which are of a sympathicotonic or sympathicotropic nature, and which may change the irritability of the sympathetic system, may be mentioned:

1. Poisons which paralyze the sympathetic system—sympathicoparalysants, ergotoxin. It has a strong selective action, only paralyzing the accelerator nerve endings, and not the inhibitory nerve endings, thus becoming a valuable agent for the discovery of the inhibitory sympathetic nerve fibers.

2. Poisons which stimulate the sympathetic system, sympathicospastics—ephedrin and tetrahydronaphthylamin. Ephedrin stimulates the peripheral nerve endings of the sympathetic system, particularly the smooth muscles of the eyeball (dilator muscle of the iris) and of the orbit (Müller's muscle), whereas tetrahydronaphthylamin stimulates simultaneously the central and peripheral parts of the sympathetic. So much for the exogenous poisons.

II. Of great biological significance are the pharmacological studies upon endogenous or endocrinous substances, studies which have already made a promising beginning in the clinic. These also it is advisable to separate into vagotonics and sympathicotonics.

A. Among the vagotonic substances which stimulate the autonomic system, cholin must be mentioned (oxethyltrimethylammonium hydroxide) which may be obtained in abundance from the cortex of the adrenals, and whose stimulating action upon the peripheral accelerator nerve endings of the autonomies is very similar to that of pilocarpin. It acts upon the vascular system and the pupil in antagonistic fashion to the other product of the adrenals, to be de-

scribed below, namely adrenalin, which diffuses after death in large quantities from the medulla into the cortex, and which almost entirely inhibits the action of cholin.

B. Among the sympathicotonic substances must be mentioned the following: Iodothyrene, hypophysin and adrenalin. The first two stimulate parts of, the last, the entire sympathetic system. The products of the glands of internal secretion are called hormones when obtained chemically pure, that is to say they are substances of simpler structure than proteins, unaffected by heat, and diffusible through animal membranes. We shall merely mention here those products of internal secretion of the pancreas, of the mucous membrane of the stomach, and male and female sex glands. These are partly sympathicotropic, partly vagotropic, and up to this time have been but little studied.

(To be Continued)

Periscope

The Psychoanalytic Review

(Vol. I, Nos. 1, 2, 3, 4)

1. The Theory of Psychoanalysis. C. G. JUNG.
2. Psychoanalysis of Self-Mutilation. L. E. EMERSON.
3. Blindness as a Wish. T. H. AMES.
4. The Technique of Psychoanalysis. S. E. JELLIFFE.
5. Character and the Neuroses. TRIGANT BURROW.
6. The Wildsbuch Crucified Saint. THEODORE SCHROEDER.
7. Pragmatic Advantage of Freudo-Analysis. KNIGHT DUNLAP.
8. Moon Myth in Medicine. W. A. WHITE.
9. The Sadism in Oscar Wilde's Salome. J. H. CORIAT.
10. Psychoanalysis and Hospitals. L. E. EMERSON.
11. The Dream as a Simple Wish-fulfillment in the Negro. J. E. LIND.
12. Compulsion Neurosis and Primitive Culture. S. E. JELLIFFE and ZENIA X.
13. Dementia Præcox in the Negro. A. B. EVARTS.
14. The Color Complex in the Negro. J. E. LIND.
15. Rôle of Homosexuality in Paranoid Conditions. F. M. SHOCKLEY.
16. Freudian Contributions to the Paranoia Problem. C. R. PAYNE.
17. Translation: Wish-fulfillment and Symbolism in Fairy Tales. F. RIKLIN.

1. *The Theory of Psychoanalysis*.—This series of papers presents in published form the lectures delivered by Jung at Fordham University in 1912. They represent the experimental development of Freud's theories, the elaboration of a superstructure on Freud's fundamental conceptions. The changes from the original theories denote merely that psychoanalysis is a plastic tool, subject to the modifications and development which its practical employment must bring. In this attitude of mind Jung traces the history of Freud's discoveries in the etiology of hysteria. The theory of the traumatic etiology received a profound and precise investigation by Freud, which led to the discovery of the psychological and psycho-physical effects of the trauma, and the cathartic method of therapy in order to set free the repressed and converted emotions which caused the symptoms. The results of Freud's work led, however, far beyond the limits of the traumatic theory, first of all into a knowledge of repression which exerts its force particularly upon the emotionally saturated memories and which seems to derive its force largely from an unconscious source. This points to the significance of predisposition as of perhaps greater moment than any incidental factors in the production of the neurosis. Further analytical experience traced the traumatic influence ever further back in childhood, but found it there of only secondary importance. Phantasy proved, as Jung expresses it, "of the same traumatic value as real shock," while no shock will produce a neurosis except in a soil already predisposed. This predisposition does not lie in an obscure hereditary problem, but is a "psychological development which reaches its apogee and its manifestation at the moment, and even through, the trauma," which Jung convincingly sets forth in an illustrative case.

Freud's penetrating research first discovered the unconscious sexual

phantasy which underlay the neurosis and this led to violent opposition to his theory. Jung attempts a fuller understanding of this sexuality which will enlighten the critics and offer a more complete working basis for psychoanalysis. To this end he conceives of a presexual stage when as yet the sexual impulse is undifferentiated from the nutritive, both of which are only parts of the one dynamic energy, the libido. What Freud has designated as the latent period, the second period of childhood, Jung considers rather the beginning of sexual development preceding puberty. Then the *libido sexualis*, merely a specialized form of the libido, is biologically prepared for its later reproductive function. The libido, at one time more fully sexual even than it is now, has been absorbed into secondary desexualized functions, a process still going on. This process is called sublimation when successful, repression when it fails. The function of reality is then more than the sexual and hence the complete withdrawal of interest or libido in dementia præcox is a withdrawal of more than merely erotic interest. In the psychoneuroses the displacement of libido is concerned with erotic interests, but there is not the complete loss of reality which is present in dementia præcox.

The polymorphous tendencies of the child represent the gradual movement of the libido from the function of nutrition towards the sexual function. These tendencies are not "perversities" in the child, for they are the normal stages of development. The imperfect development of these early inclinations result in perversities, rightly so-called when found in the adult.

The sexual tendency, then, which gives pathological activity to a traumatic event is a "retardation in the process whereby the libido frees itself from the manifestations of the presexual stage." The individual develops but his libido remains in arrears and the foundation for conflict is laid. It is not simply that the pathologic moment makes this conflict manifest. The patient has lived in a state of retarded emotional development, in a world of infantile phantasy with an exaggeration of subjective wishes. The libido has turned back from the adaptation to reality because reality confronts the individual with some task which he has not the courage to face. The libido thus becomes introverted, that is, applied to the inner psychical world, rather than turned to the external world. Among the reminiscences which occupy it there the parent complex is the most important, determined by the intense imitation or identification which exists especially in certain sensitive children and which causes difficulties in adaptation to the infantile surroundings. The individual's emotional attitude toward his small world repeats itself in his attitude toward the larger world of later life. Intellectually he may be beyond this but emotionally infantile expectations, hopes, prejudices and the like exist in his unconscious. This unconscious sphere is then the field for psychoanalytic investigation. The dream furnishes the royal road into it, and, moreover, the historical study of the unconscious psychology as revealed in religious development and myth creation is of great value. Individually also association experiments, observation of symptomatic or symbolic actions reveal unconscious content. Freud found the root complex to lie in the Oedipus or parent situation, but since this is common to all it is not pathogenic unless it is subsequently set in action. An examination of the case Jung presents in illustration shows that there is a regression of libido to reminiscences which it actualizes into an apparent etiology. He utilizes Freud's figure of the river bed whose affluent streams, active in childhood, become emptied and dried up as the stream follows its main channel in adult life. Now the libido meeting with an impediment in the form of a demand of real life from which the individual shrinks flows again into these old side-streams and reanimates them. So that the pathogenic conflict exists in the actual present but returns to infantile modes of reaction. The value of psychoanalytic therapy lies in its willingness to go with the patient back into this

regressive phantasy world and, instead of denying the phantasies and prescribing the impossible task of ignoring them, discovering the libido that has become hidden there, releasing it and bringing it back to the real world for productive employment. Such a therapeutic conception does not shrink from the inevitable transference phenomenon, but subjecting that also to analysis, together with conscientious self-analysis on the part of the physician, makes use of the transference and the phantasies which it further arouses in order to make the infantile phantasy attitude objective to the patient and so release the libido and guide it back to reality, to a moral autonomy.

2. *Psychoanalysis of Self-Mutilation.*—This partial presentation of a case reveals several points of special interest. The serious injury by cutting which the patient inflicted upon herself bore a masochistic element of identification with the mother and a sadistic one in which she identified herself with the father. She hysterically shrank from mental suffering and substituted the physical suffering for it. It was also a symbolic substitute for masturbation and a punishment for passive submission to this in childhood. It was, moreover, a primitive vicarious action to bring about desired menstruation. Bound with the aggressive nature of the act was a desire for sympathy and surgical treatment. The therapy employed was simpler than complete psychoanalysis because the painful events which led to this pathological manifestation were all in consciousness. She was led to analyze her own complexes and gained great self-control, and an adequate opportunity was found for the sublimation of her desires and impulses.

3. *Blindness as a Wish.*—Ames reports a remarkable case of blindness, which by exclusion of all other possible causes was assigned to an hysterical mechanism. A brief analysis in which the patient's dreams formed the only access to his unconscious reaction to domestic and business difficulties, produced a complete removal of the blindness as sudden as its onset. A frequently recurring dream was of a fight in which he was always worsted, typical evidently of his submission to his external difficulties. His blindness gave him distinct satisfaction that he need no longer see his wife, and with its occurrence the termination of the dream changed to victory in the fight. As soon as the patient understood the unconscious reaction as the meaning of his blindness he realized that there was a better conscious victory over the situation than the physical disability and immediately recovered his sight.

4. *The Technique of Psychoanalysis.*—Jelliffe enters here upon a series of articles for the beginner in psychoanalysis in order to unfold to him the method by which its task is accomplished, which the author defines as the understanding of the racial and individual inheritance which determines our psychical life. Psychoanalysis must be considered as a method, and as such it is applicable to all departments of life. Here, however, it is treated in its strict applicability to medical problems. This special method is needed because there has been serious rejection of the assumption that mental facts are just as real and absolutely determined as any others in nature. Previous psychological investigation has been too much limited to the physiological side and has also neglected the psychopathological. The data of the latter psychoanalysis seeks to unite in a concept of origins and potentiality.

The material for psychoanalytic analysis must then be approached in a sympathetic, patient attitude which recognizes mental facts and takes the trouble to gather them. Processes and not diagnostic terms must be sought. The physical side of an illness must never be neglected but the distinction must be kept between the two forms of treatment and their respective values. Ignorance and indolence may say that mental facts are intangible, but if we deal with underlying dynamic factors they are comprehensible. Facts cannot be intangible. Yet there are certain patients impossible of analysis and others whom it is unwise to undertake. Ignorant patients fall into the first cate-

gory. These embrace first the idiot and the imbecile. Perhaps a physical factor can be first removed and the patient afterward benefited by analysis, but if such defects are insurmountable no benefit can be derived and this should be frankly stated. Here as in other cases psychoanalysis might gather valuable scientific material for society at large, but no advantage could come to the patient. Psychoanalysis especially in the hands of a beginner can do but little good with the high-grade imbecile, while positive harm may follow, and results due to the original condition will be attributed to psychoanalysis. In cases of dementia, the term loosely used, analysis is impossible if intellectual plasticity is gone. A partial analysis is helpful in some cases where an emotional upset causes the appearance of a greater deterioration than really exists. Those whom it is unwise to analyze are those who do not enter upon it with serious intention. They have a fair working basis which they will not give up. They establish a quick rapport and as easily fall away. When the psychoanalytic probe really touches them they desert. Others of this class are the well-to-do for whom the democratic and pragmatic attitude of psychoanalysis interferes too seriously with their mode of life and thought. The harm which critics attribute to psychoanalysis is founded on a false notion of its nature, but even faulty psychoanalysis has this advantage over ordinary neurological methods: it starts a dynamic process which will ultimately work out to the patient's good. Harm may result to the analyst and the patient if a beginner attempts to treat hysterical young people, paranoid præcox, certain compulsive states and the like. The analyst himself may be led into an error of sympathy with a young hysterical and encourage a harmful transference. A certain group of patients with strong father complexes start out to overcome the analyst and refuse to recognize him as only the surrogate for the father or brother image of the infant libido. The strong transference which provides the conscientious analyst a means for his work is thus sometimes unmanageable in such cases and in manic depressive psychosis as well. Success with these last named cases depends on a high grade of intelligence in the patient when, with mild attacks or in free intervals, much good may be done. Consultations are a source of danger to the psychoanalyst because of want of recognition of the sphere and scope of psychoanalysis and its distinction from physical treatment.

There can be no comprehensive fixed rule for psychoanalysis because each case is an independent problem. Yet psychological analysis is not new and the psychoanalyst should know the literature of the early psychognostic attitudes. He should also familiarize himself with the various philosophical systems in order to meet successfully his patients' special philosophies of life. Jelliffe then gives an extensive bibliography of current psychoanalytic literature available for the analyst and essential to his work.

5. *Character and the Neuroses*.—Burrow is concerned here not with the character trends of the neurotic developed out of sublimations, but with those traits and sentiments which are correlated with the original biologically moral and social reactions in which the neurosis itself has its roots. Freud's conception of conflict as the essential factor in the neurosis explains all the current descriptive terms of "nervousness." Biologically probably individual consciousness itself arose out of the clash between individual desire and social demand, when there was first an inevitable yielding to superior force and then through penalties of violation a conscience or moral consciousness arose. Repression, which emphasizes the intrapsychic conflict, arises at the same time with the social consciousness. The neurotic character is therefore organically a moral one, whose very evasion of reality is stimulated by a question of right and wrong. The severity of the conflict and the suffering entailed testify to this character, but there are also certain broad traits related to the fundamental reaction and the operative factors in a neurosis. They

are child-like simplicity, doubt and distrust of self with overestimation of others, gentleness, love of beauty, especially such as appeals to the infantile psychic attitude, also a mental introspectiveness which makes the individual intuitive rather than critical and methodical in thought. This moral sense inherent in the neurotic and fostered by his "stolid repression" should be turned to good account by psychoanalysis in the reëducation of the patient to take a part for which he is peculiarly fitted in the social and educative problems of the day.

6. *The Wildisbuch Crucified Saint*.—A brief psychological study of the erotogenic origin of religion is made from the story related under the title of this paper. It is the report of a tragic occurrence in the early nineteenth century in a little hamlet of Switzerland, a record of religious fanaticism on the part of a precocious peasant girl and a band of followers, the sexual character of which was openly expressed in the lives of a number of them, the leader included. The affair, which lasted a number of years, ended in a scene of religious frenzy culminating in the frenzied death of the leader and her sister. Certain psychic factors are fairly obvious. Margaret Peters, the leader, found in her religion an answer to a subjective need based on an egomania developed from early childhood through the attention bestowed upon her precocity and the mystic interpretations of her family. The pietist religion to which she attached herself gave opportunity for expression of her subjective need, whose sexual character was revealed by her adolescent convictions of sinfulness. The sexual immoralities of the group bore testimony to an unusually intense sensualism and the suppression of this furnished the emotional dynamic to which the religious environment gave the material. The conflict which they extravagantly projected as a battle with the forces of Satan was an expression of the internal conflict between desire for expression and for repression of erotic passion. Sadism and masochism are evident, but there is a further psychic demand, arising from the suppression of earlier indulged sexuality, for an intensity of stimulation sufficient to produce a psycho-sexual orgasm. The religious contemplation of divine love, with exhortation and prayer, were at first sufficient, but later increasing intensification of religious furor was demanded. The author says in this case "the very essence of religion as manifested in the 'supernatural' powers was merely supernormal sensualism, psycho-erotism spiritualized, transcendentized, apotheosized." He uses this as one of a series of inductive proofs which he is gathering of the erotic source of religion.

7. *Pragmatic Advantage of Freudo-Analysis*.—Dunlap briefly compares the quick cure of a patient of Dr. Prince troubled with an emotional complex with the protracted method of Freudian analysis. The latter may sometimes justify itself pragmatically, he thinks, but according to his conception it bases its therapy on the creation of new "associates" which are developed through a long period of time, in order to lead the patient to discover them for herself, and which will thus undermine the original association. As almost anything can be used as a sexual symbol, sexual associations form admirable means to the end. Freudian analysis, he maintains, is a substitutional therapy rather than an attempt to get at the real pathological cause.

8. *Moon Myth in Medicine*.—White shows the place this myth holds in the history of medicine as a manifestation of the working of the libido and illustrates this more fully by the place of the moon myth in other departments of thought. The moon is an unavoidable object of interest universally and is therefore an object of libido according to the energetic concept in the mental realm. It naturally was conceived, like the libido which it represented, as both destructive and constructive in its effect. This would lead further to an attempt on the part of man to control its action. Also its increase and decrease become the symbol of the same changes in man or in things mun-

dane and are believed to have a similar effect upon these. It is not strange, then, that the moon is of importance in all mythology, in all the history of medicine, both physical and mental, an object of firm religious belief and of worship even down to Christian times, that it is prominent in love and has a place in nursery rhymes. It becomes a symbol of all the aspects in which the libido manifests itself and when, for example, man does not appear to rise again at death as the moon does, various myths must be invented to account for the difference. The recapitulation theory is borne out by examining child psychology in regard to the moon. This reveals the same notion of its power for good or for ill, its punitive power, its erotic significance and its analogy with growing things. Moon myths reveal markedly the ambivalency of the thought process, which tends always to recognize the opposite principles, the contrasting aspects of the same thing, which only repeats the ambivalent aspect of the libido.

9. *The Sadism in Oscar Wilde's Salome*.—It is Wilde's own strong sadistic impulse, Coriat says, which has given the intensely sadistic interpretation to the beheading of John the Baptist in the tragedy of *Salome*. The dialogue of the drama develops this until it reaches the point of erotic ecstasy which closes the cruel exhibition of murder lust in the tragedy.

10. *Psychoanalysis and Hospitals*.—Emerson takes up the admission of psychoanalysis as a department of hospital treatment of equal importance with other divisions of medical service, and of its own special value because of the cases which cannot fall under the other heads, and particularly of those borderland cases which need often the psychical help along with other treatment. He illustrates this with several examples of patients who were much benefited by partial analysis, of others who had been treated in vain until psychoanalysis discovered the real nature of the illness. He remarks in passing that the partial analysis, often the best under certain conditions, is further justified by the avowed purpose of psychoanalysis, which is to restore the patient to social usefulness and not necessarily to bring him to complete knowledge of himself. Emerson meets some of the objections which might arise to psychoanalysis in the hospital. The transference seems sufficient to assure regular attendance in the out-patient department. The self-absorption of the patient prevents disturbance through unavoidable, distracting interruptions and the free treatment presents no difficulties. Strict separation of psychoanalytic from somatic treatment prevents any interference of one with the other, even when carried on at the same time. A chief difficulty lies in providing sublimation outlets, proving therefore the importance of that therapeutic factor. The discipline imposed upon a severe hysterical case confined to the hospital works advantageously and such a result manifests the originally undisciplined nature of the hysterical character. A secondary but important result of hospital psychoanalysis is the advantage to scientific research. There is opportunity "to demonstrate the protean and deceptive forms of the symptoms of hysteria" in observation of them and in their convincing solution. Furthermore, such knowledge prevents future mistakes of diagnosis and useless somatic treatment and has prophylactic value as well.

11. *The Dream as a Simple Wish-Fulfillment in the Negro*.—The negro offers to the American investigator of dreams the simple psychology of the child, while perhaps more accessible than the latter. Lind has tested this in examining the dreams of one hundred negroes of an undeveloped type. Eighty-four of these dreams were a frank expression of wish-fulfillment, most of them containing but a single idea briefly stated. None of them presented evidence of distortion, condensation, latent content or secondary elaboration. The subjects being confined in jail illustrated in their dreams a tendency noted by Freud, namely, that the dreams of adults transferred to unusual conditions of life show a particularly infantile character. Negroes

with mental defect or simple deteriorating psychoses exhibit the same simple type of wish-fulfillment in dreams.

12. *Compulsion Neurosis and Primitive Culture*.—Jelliffe introduces us to a patient suffering from a severe, prolonged compulsive neurosis and allows her to make her own comparison between the intrusive phantasies which occupied her and the more frank and natural expression of these among people who normally exist still on the plane of culture to which her neurosis had consigned her. The study strikingly reveals the aggressive sexuality of childhood even when limited to phantasy expression, and moreover the manifold polymorphous elements it contains. The intense activity of this sexuality and the early sense of guilt it aroused prevented even an ordinary forgetting of the phantasies and accompanying minor transgressions, and produced an elaborate and oppressive, unproductive ceremonial as a substitute for the unacceptable sexual elements. The discovery through comparison of the forms of her phantasy as constituents of the thought of man at a certain stage of development proved to her their legitimacy and so helped to remove the over-egoistic sense of guilt, and at the same time revealed the extent of her reversion to infantile or primitive modes and products of thought. Likewise she learned to understand the purpose served by the substitute ceremonials, since they, like the customs of the savage, grant to the tabooed wish the necessary denial and an indirect gratification. Her dreams had been abundant in the same phantasies and so prolonged both the pleasure and the suffering. She finds a comparison here in the importance to the savage of his dreams arising from his direct animistic interpretation of them.

13. *Dementia Præcox in the Negro*.—The psychiatrist, Evarts reminds us, in dealing with the negro must take into consideration the lack of conformity of his earlier experience to that of ours, that is, also, of the psychiatrist himself. The author reviews from various sources the history of our colored population before they were brought to the United States. There was such constant and extensive migration and admixture of so many tribes of greatly varying degrees of civilization that the result which finally was found on the West Coast of Africa was the by-product of a "vast ethnic whirlpool," according to Ellis the "dregs and off-scourings of Africa." It was here that the slaves were taken and these were selected for physical strength and vigor rather than mental endowments. They showed the infantile and primitive characteristics distinctive of their plane of development. Nevertheless, they were thrust violently into a civilization removed by forgotten centuries from their primitive state and there was demanded of them conformity to all the standards and conceptions of our civilization. Then through emancipation they were thrown into a state of independence for which there had been no racial preparation. The newer definition of insanity as a failure on the part of the individual to adapt to his environment explains why insanity then should be on the increase in this race. Since dementia præcox is a deteriorating psychosis, its manifestation differs in a race that has not yet attained the stages of development from which the white patient deteriorates. The etiology in heredity and exciting causes remains the same as does the pathology. The symptomatology differs in certain characteristics. The power of voluntary attention is normally so little developed in the negro that its impairment "is more apparent than real." Ability to continue ordinary occupation in an advanced stage of the psychosis is due to the mechanical nature of ordinary negro occupation and the imitation and submission to authority they bring to their labor. Emotional deterioration is manifested early as emotional control is yet undeveloped in the race. Sexual perversions and resort to symbolism are rarer than in white patients, bearing testimony to the absence of repression normally with the negro in this sphere. Hallucinations show a particularly animistic character. The catatonic type of dementia is

most pronounced, its typical symptoms existing in extreme degree. Remissions frequently occur, as the patient has not so far to go back to her original condition, but a strain is liable to produce another attack and the end result of dementia as with all other patients is the purely vegetative existence.

14. *The Color Complex in the Negro.*—Lind brings attention to the common or universal complex with the negro in the United States arising out of his subordination. He names it the "color complex" because of the most obvious cause of the negro's position. This complex is discovered in the negro's rather primitive theology, in his dreams, through the association tests as far as these have been used, but most unmistakably in the delusions of the psychoses, in which he compensates himself for that which reality has denied him. Lind illustrates this briefly from a number of cases and then discusses in detail the delusional system of a negro serving a life sentence for murder committed somewhat accidentally at a scene of merry-making. It was impossible to obtain an adequate history of the onset of the psychosis, which had begun in prison, and in the Government Hospital for the Insane the defence which his psychosis had thrown around him rendered him almost inaccessible. Lind, therefore, gives the apparent explanation of the psychosis. He was probably at first stunned by the consequences of his sudden act and at the same time built on a possible release from punishment. But as a few years went by the reality of his situation forced itself upon him and proved impossible of acceptance. Then the psychosis manifested itself. He built up a delusional world which he substituted for the unbearable reality. His system is summed up thus: He is not a murderer because his victim is still alive. This delusion was not elaborated to any extent because it is too simple a defence to suit the negro, who is prone in court "to protest too much." Second, he is not imprisoned for murder because he himself built and owns the prison. Third, he is not the negro imprisoned for murder, because he is a white man disguised as a negro. A fourth method of compensation in process of formation is also concerned with mistaken identity. These last three delusory systems are probably founded on the poverty and color complexes, which have existed since earliest childhood, poverty in fact being subordinate to the color complex. A review of the obtainable data of the delusions reveals the large part the color complex distinctively plays. Lind follows Adler in seeing in this the important part played by the sense of inferiority in conflict with the "will to power" in the etiology of mental disturbance.

15. *Role of Homosexuality in Paranoid Conditions.*—It has been shown through the accurately scientific work of Freud, followed by that of other psychoanalytic investigators, that the symptoms of paranoia can be traced to the unconscious homosexual impulse and the unsuccessful attempt to repress it. This gives rise to the delusions of persecution, erotomania, jealousy and grandiose ideas. Schockley gives attention further to some minor conditions which give the patient a paranoid character, without ending in a noticeable degree of deterioration. These can also be shown to be a product of the typical reaction mechanism of the unconscious homosexual inclinations. Sometimes these are evident to the individual and the attempt to suppress them being unsuccessful gives rise to compensatory reactions of varying gradations in the paranoid character. In other cases the homosexual tendency is only unconscious and its breaking through to consciousness causes distortion of the libido in projection upon the outer world in a true paranoia. This distortion may assume a greater range and combine with it distortion by means of symbolism and a partial withdrawal of affect, which then results in a dementia præcox of the paranoid type. Sublimated homosexual libido, or that successfully repressed, does not produce pathological symptoms. Besides, there must be present to produce the paranoid manifestations an heredi-

tary mental instability which causes the individual to succumb to the psychic trauma arising out of the conflict with the unbearable idea.

16. *Some Freudian Contributions to the Paranoia Problem.*—Payne has collected numerous articles, mostly from the German literature, and presented them in condensed abstract form in order to present some of the results of investigation into paranoia and paranoid conditions. They are the work of Freud and those who have considered the subject from the Freudian aspect and thus succeeded in elucidating the real meaning beneath the surface of external mental symptoms.

17. *Wish-fulfillment and Symbolism in Fairy Tales.*—White's translation has made accessible an important work by Riklin, in which he employs the psychoanalytic method for the interpretative understanding of fairy tales. These are reproductions of old myths, or mythological fragments utilized in a new psychical structure, a new myth. They can be interpreted by comparing them with dreams and psychotic structures both in content and in mechanism and at the same time they confirm the psychological meaning and reality of these individual products. The rôle the sexual plays in them is surprising only if we forget how constantly that influences all thought and action throughout life. The study reveals the psychological foundations of the tales. They are "inventions of the directly utilized, immediately conceived experiences of the primitive human soul and the general human tendency to wish-fulfillment." The complete exposition of this must be reserved for the reader's own examination of the translation which is published in the monograph¹ form as well as in this volume of the Psychoanalytic Review.

LOUISE BRINK.

Deutsche Zeitschrift für Nervenheilkunde

(53. Band, 3-4. Heft)

1. Acute Poliomyelitis in Norway. LEEGAARD.
2. Contribution to Our Knowledge of the Central Mechanism of Speech. MAYENDORF.
3. Curable Severe Optic Neuritis in Connection with Cerebellar Ataxia in Whooping-Cough Encephalitis. STRÜMPPELL.

1. *Acute Poliomyelitis.*—This writer tells of the rich material of acute poliomyelitis in Norway and gives a valuable study of the disease in that country for many years back. The article is exhaustive and is elucidated by forty-five illustrations, including many maps and charts. The geographical distribution of the disease is given and a chronological grouping is made as follows: First period includes all records up to 1903; second period from 1904 to 1907; third period from 1908 to 1910; fourth period from 1911 to 1913.

After about two years of comparative freedom from the disease, its periodic return is to be looked for. There is yet no solution to its etiological cause. It appears almost certain that the small microbes exist outside of the human body. The writer's investigations show that the microbe appears under different climatic conditions but that it develops mostly in the summer months. The organism is probably present in well persons as it is in the sick and it may lead either to a mild or to a severe disease. It is mostly found in the alimentary canal and extends from the mouth downward.

Often where we would expect the contagion to spread, contagion has not followed. It appears that a great multitude of organisms must get into the

¹ Nervous and Mental Monograph Series, No. 21.

mouth at times. The contagion lasts about three weeks as a rule but at times much longer.

When an epidemic appears, all crowded places should be avoided; schools and churches should be closed. Great cleanliness should be observed, especially as to the hands; eating utensils used by the patient should be rendered sterile. Especial care should be taken by railroads, steamships and automobiles, since it appears that contagion is often transmitted from point to point by these carriers.

2. *Central Mechanism of Speech*.—In addition to some general consideration of the subject, a case is reported which finally came to autopsy. A woman, sixty-seven years of age who ten years previously had been interned in an insane institute for about a month, was found to have hallucinations of hearing and delusions of persecution. She remained in this condition for about a year, when she was stricken with croupous pneumonia and during convalescence from this infection a right-sided paresis developed with loss of speech. She was a complete mute. In the paralyzed leg there was a positive Babinski. For seven months there was no change and then slight improvement began. The capacity for speech appeared suddenly and the patient could use her right hand sufficiently well to play the piano.

A year and a half later, when the patient came again under observation, she showed a most markedly complicated speech disturbance. She died of an unknown disease. At autopsy the brain showed a large cyst in the left hemisphere in the pars opercularis and the triangularis frontis.

3. *Optic Neuritis with Cerebellar Ataxia in Whooping-Cough*.—The writer observes that as a result of whooping-cough it is recognized that there may develop convulsions, hemiplegia, diplegia, bulbar symptoms, eye-muscle paralysis, speech disturbance and also severe central disorder of vision; likewise there may be cerebral and spinal symptoms and even polyneuritic manifestations. However, accurate observations have but seldom been made in the cases with cerebral symptoms and optic neuritis.

Reference is made to a patient reported by Alexander and Nacht where for choked disc and complete blindness, trephining was done. A few days later vision returned and within a few weeks it was completely restored.

We are informed by the author that his patient, a boy of twelve years, after a few days of slight disturbance of vision, developed severe papilledema and at this time he was unable to stand; there was a slight Babinski sign upon the left side. The condition was not apoplectiform—did not follow a severe paroxysm of coughing. During the period of total amaurosis there was an entire absence of the light reflex. The total blindness lasted between four and five weeks and three or four weeks following this the patient could see fairly well again.

The spinal fluid was clear and only responded weakly to the Nonne globulin test; there was no increase in the number of cells.

The localization of the process was believed to be in the region of the corpora quadrigemina on account of the limitation of the ocular movements; the ataxia which was present was explained by the participation of the red nucleus in the inflammatory process.

In another case the anatomical findings were those of hemorrhagic encephalitis. The author inclines to the belief that the focus of inflammation, since it is largely a circumscribed process, is more likely a bacterial than a toxic one.

N. S. YAWGER.

Book Reviews

THE PSYCHOPATHOLOGY OF EVERY DAY LIFE. By Sigmund Freud, LL.D.
English translation by A. A. Brill, M.D. The Macmillan Co., New York.

We are more accustomed to learn from books how to remember than how we forget and are surprised to be told that the latter process is the result of not mere chance, but is the striving of the unconscious to ignore whatever is unpleasant to it in our past, or often indeed to substitute for the less agreeable fact the deeply hidden hope it cherishes for the future. That many of these desires are of such nature that we cannot confess them even to ourselves, or would reject them if realized, is perhaps why they are kept out of the conscious; and the chief purpose of the study of our unconscious self, to which this book offers a simple beginning, is that we may recognize and reject what is bad in our motives for action and preserve what is good.

For this inner self is in many respects a brutish sort of being, a compound perhaps of the feelings of earlier types further moulded by the mind of the child. Its purpose is solely to preserve and perpetuate the individual, to nourish it, preserve it from danger and obtain its desires which again lead mainly to these purposes of food and continuance of the type. It has little care for the welfare of any other than itself, and even the welfare of the single life must yield often to its insistence on continuing itself in a future generation.

These qualities, still useful in themselves to-day, were obviously essential to earlier types of beings. Only the ruthless could survive, and thought of another's welfare had small place in the feelings of the beings that found existence a mere round of eating and being eaten. Social life, too, was so slight as to make but little call for any but the selfish qualities.

This ancient predatory life is repeated in the child, with the purpose of obtaining every advantage for the future adult, a necessary process which also, incidentally, helps to fix the control of these desires at a later time in life when the needs of the community as a whole require them to be in large part sacrificed, outwardly at least, for the general welfare. Yet so deeply are the selfish motives ingrained in us by the influence of countless years that instead of being wholly cast off they are in large measure merely pressed down out of sight into the unconscious, where, still working at the command of that unbidden guest, they are often more powerful in shaping our lives than when openly acknowledged, making strange protests against their repression.

We learn also, not altogether to our surprise, that, however we may attempt to suppress it, the truth will out, and to a keen observer, all attempts to conceal the actual facts are without avail. Is this not what all the ages have sought?

Novel as are the principles involved, we must recognize many facts that occur in our daily lives and in the lives of our associates. We even wonder that the instances given are not more often of a more striking character, like that of the "aliquis" forgetting. The book impresses one as being simply a preliminary study of this subject, much limited, as the author says, by the exclusion of the pathological cases with which his life has been occupied. Doubtless later studies of the man in the street will add greatly to their appeal. It is, so to say, the chips and fragments of a life of study.

The classification is, as stated, without much significance. The principal addition that suggests itself is a discussion of the efforts of the unconscious by inner signs or warnings to protect us from serious mistakes and dangers, a subject peculiarly interesting to mankind, about which beliefs and superstitions have clung in all ages, but which is only lightly touched upon in this book. Altogether it impresses one as a most interesting but sketchy introduction to a vast subject that is worthy of great elaboration.

F. LAWRENCE.

DEFECTIVE CHILDREN. Edited by T. N. Kelynack, M.D. William Wood and Company, New York.

Dr. Kelynack has brought together in this volume very valuable material, which more than serves the purpose for which he has gathered it. It is intended to serve as a sequel to "Medical Examination of Schools and Scholars," published in 1910, and like that to assist, though now in more advanced form, the work of medical supervision and educational treatment of the vast body of children defective in mind or body or both.

This book deals very practically and effectively with these various phases of defect in children and the educational problems connected with each variety of defect. Prophylaxis, while by no means ignored, does not fall within the province of these chapters, but they deal directly with a concise description of the forms of defect common among children and suggest the best modes of treatment which can be carried on through the coöperation of the medical and educational authorities, a work which has received great advance in England recently under the supervision of Sir George Newman, Chief Medical Officer of the Board of Education.

Each individual subject has been put into the hands of an expert, with the result that each chapter is presented with a clearness and conciseness of theoretical knowledge in regard to the disease or defect, whether mental or purely physical in its manifestation, the etiology is treated with the conservatism which belongs to most careful and thorough knowledge and research, while the actual experience which these authors have had in these departments makes their discussions of very definite value for the educational work to which the book is devoted. These very qualities, moreover, make a most valuable brief treatise on these forms of children's defects and the possibilities there are for their improvement or merely for better adjustment of those who bear them to the conditions of life.

For as Dr. Kelynack expresses it, though the defect cannot by any means always be removed even by improving the condition and providing special education, the work "endeavors to indicate how the maximum of benefit may be attained for the physical well-being and educational development of the defective child." Sometimes careful attention with a brief attendance in a special school is sufficient, at other times residence in such a school must be permanent. Again, a protracted treatment of some deformity demands special educational facilities in connection with institutional treatment, or it may be only close supervision is needed in an ordinary school for other defects. All these matters are discussed with a view to the child's best welfare, and so to the chief economical end.

The chapter on epilepsy may perhaps be cited as typical of the brief yet thoroughgoing treatment of the various subjects as illustrating the skillful consideration of the manifestations of the various disorders, classification of symptoms, suggestions for treatment, and with all the difficulty of limiting the etiology specifically, but the recognition rather not only of a variety of causes but of the fundamental inherited constitution or diathesis of the child.

And yet even with this we feel throughout the discussions of the book that lamentable want of recognition of the fundamental background of

causes which only psychoanalysis has seemed to penetrate, and which the British medical profession have seemed so slow to grasp, but which must have in time an immeasurable influence on the understanding as on the treatment, medical and educational, of all forms of defect.

The chapters which report from various other lands, our own among them, the progress of the coöperation of medical and educational work among these children form a further feature of interest and value. The book is one that must prove itself of very definite service in theory and in practice, and a stimulus for the furtherance of this work still in its beginnings.

JELLIFFE.

THE AMERICAN ILLUSTRATED MEDICAL DICTIONARY. By W. A. Newman Dorland, A.M., M.D., F.A.C.S. W. B. Saunders Company, Philadelphia and London.

No true dictionary is a mere collection of static terms, however correct and finished in definition. The appearance of Dr. Dorland's well-known dictionary in a new edition, the eighth, following close upon the last, proves its true value as an active, vital force in medical activity and progress.

The author has sought to make it a serviceable collection of the various means whereby medical work is accomplished as well as a plastic and accumulating record of such activity and progress. It applies in this not only to medical science, strictly speaking, but includes comprehensive reference to the allied sciences and professions with which medicine coöperates and upon which it depends.

There is clearness and consistency in the arrangement of details which make the book one easy to consult, and which give compactness without detracting from the necessary fulness and completeness of information. There is manifest a very careful attention to accuracy and simplicity in regard to such matters as derivation and pronunciation, which admirably fit the volume for easy and reliable reference.

Some limitation is still apparent in embracing the conceptions of the newer neurology and psychology, which is permeating medical thought. Freudian ideas and methods are not unrecognized, but certain important terms are still used in their old limited sense only, while others are entirely omitted. The definition of the term "libido," *e. g.*, restricts it to the old narrow sphere and shows that the broader energy concept of the psycho-analytic thought is not yet comprehended nor accepted at its true value.

However, this new eighth edition is an illustration of its own evolutionary character. It brings much that is new and presents both old and new matter in freshly serviceable form, while it will itself keep abreast with the development and advance of medical science and practise.

JELLIFFE.

HUMAN MOTIVES. By James Jackson Putnam, M.D. (Mind and Health Series.) Boston, Little, Brown and Company.

The manner of presentation in this book of the task of psychoanalysis and its profound discoveries in the sources of human conduct and its constructive understanding of these sources must win admiration and thoughtful attention. The brief pages are compact with the wide-reaching interest of the subject and yet clothed in such language as opens up the possibilities of the complete understanding of the hidden unconscious self, and thereby self-mastery for ever progressive adaptation of the individual to social ideals with increasing opportunity for expending the creative energy into these higher channels.

The attempt to separate two sources of motives, the ideal, expressing itself in religion, and the evolutionary, is somewhat bewildering, and seems to

place the ideal, even our source of energy, above out of reach. Such at least would be the implication. However, when Dr. Putnam discusses the work of psychoanalysis, he reveals in its constructive mission the growth and development of the higher ideals and the turning of the energy from lower planes into these sublimation channels, though he may still insist that they hover over us from above to be grasped by our aspiration.

The brief history of psychoanalysis and statement of its principles present the subject very completely for a general knowledge of it and its function in the education of the child or the better understanding of one's own adult life. The more detailed exposition of its investigations through symbolisms, dreams and so on is merely mentioned and then properly left to the sphere of the physician.

The comprehensive form of this little volume is well illustrated in certain passages, as, for example, the full meaning of the "resistance," its origin and its utilization by the psyche; the development of pathological symptoms out of attempts at compensation; the presence in the unconscious of the quality opposite to that manifested, known as ambivalence. These all show a grasp of the subject which makes the book pregnant with helpful information and stimulating suggestion.

JELLIFFE.

NERVOUS AND MENTAL DISEASE. By Church & Peterson. Eighth ed. W. B. Saunders & Co.

The eighth edition consists of a partial amplification of the seventh, comment upon which has been made in these pages. As the authors say in their preface only a few material changes have been made. They have sections on Labyrinthian Disease, Infantile Paralysis and Syphilis of the Nervous System. The book remains essentially, however, as it has been for the last ten years, especially the chapter on Psychiatry, which has received little change since the earliest editions.

How the authors can maintain as they do (Part VII) that the diseases of the nervous system there given are without known nervous anatomical basis is incomprehensible. To contend that tetanus, Huntington's chorea, hydrophobia and some twenty or so other diseases have no known pathology is to be hopelessly behind the times.

L. B.

CHARACTER AND TEMPERAMENT. By Joseph Jastrow. D. Appleton and Company, New York and London.

The acknowledged endeavor of the author of this book is to present certain aspects of the study of the mind, which will show the relation of the original impulse in its social bearings, the development of the psychological life toward social demands and social unity.

That seems to be the reason for the series which this volume inaugurates. The author has adopted as his title a current phrase to express the theme, which he defines more nearly in what he says might be the subtitle, *the psychological sources of human quality*. These he endeavors to show arise from our endowment or inherent tendencies, original reactions to sensory stimuli, and from the acquired tendencies, the action upon us of environment, with all that includes of increasing and complex demand for refinement of original reaction, enlargement of our scope of sensibilities, guidance and modification through intellectual considerations, in short, all that culture develops within us and spreads about us to produce the endless ramifications our mental reactions life must take. Yet throughout all, however far we may seem to have developed from the original, primitive sensibilities, they may always be discovered as conditioning in some degree the higher complex

reactions. The quality of endowment still lies at the root and sends its influence, its motive force through the utmost complexity of its derived, acquired qualities. It is this higher refinement in turn that controls the original impulse, molding it to more refined service.

Such seems to be the twofold idea, whose elaboration provides material for many pages. It would seem that the real thought contained could have been very briefly stated. Instead it is woven and interwoven into a most elaborate web. One can but admire the skill with which the meshes of the web are trailed over the one simple thought of the book without obscuring it from view. Frequent detailed illustrations add their fine spun meshes but with never a change of pattern. It is all of the same colorless hue, an endless spinning of increasing fineness to convince us of the endless and intricate refinements of our mental reactions.

It seems to lack vital purpose. The author refers at some length to Freud, but finds his teachings somewhat too narrow for these "larger principles of emotional psychology," with which, however, "one may still interpret Freud's 'Leit prinzip.'"

Freud's abundantly vital hypotheses reach profoundly into the roots of those qualities of endowment, which Jastrow scarcely realizes beyond the conscious levels. Freud's conceptions of the psychical superstructure of individual character and social culture built upon these foundations is so complete and so comprehensive of the reality of life that this attenuated spinning will not bear comparison with it. It brings no new thought nor does it give fresh stimulation from the old. It is on the whole a somewhat wordy and stupid book.

L. B.

SENESCENCE AND REJUVENESCENCE. By Charles Manning Child. The University of Chicago Press, Chicago, Illinois.

Succession of generations and repetition of the life cycle are the two great facts of biological interest. The latter is marked by definite changes, which constitute aging or senescence, while the succession of generations is maintained through the development of younger individuals from older ones.

In what do these processes of senescence and rejuvenescence consist? What is the significance of each? This work is devoted to answering these and similar pertinent questions. The investigation brings forth some important considerations of especial interest and value.

Child has directed his researches principally to fresh water planaria, certain lower forms of animal life in which conditions can be observed and also experimentally controlled in a way not possible with former studies of senescence in man or other higher forms.

Moreover, he explains his methods with enough technical detail to convince one of the painstaking accuracy of his experimental work and at the same time to enable the reader to follow his procedures with intelligent interest. He examines and sets aside various vitalistic theories of life as all merely deferring the fundamental question of its nature and constitution. His work rests upon the dynamic physico-chemical conception of life, which defines it as "a specific complex" of dynamic changes occurring in a specific colloid substratum which is itself the product of such changes and which influences their course and character and is influenced by them. It is this metabolic activity that is observed in its relation to the processes that accompany growth and differentiation and which result in the aging of the organism, and to the processes of reduction, that is, the breaking down and elimination of tissue material and dedifferentiation, or return to the more embryonic form.

It is possible to measure the metabolic rate by the susceptibility of the

organism or part studied to cyanid or other narcotic. Furthermore, it is demonstrated that the metabolic rate is greater in the younger organism than in the older. The accumulation of material in the substratum resulting from growth and differentiation causes decrease of rate, while on the other hand the utilization of material in the process of reduction increases the rate. This is established by the experimental isolation of animals or portions of individuals under induced conditions of starvation. This necessarily initiates the process of reduction and results in smaller but physiologically younger individuals, which when food is restored are capable of continuing in their turn the life cycle by growth and differentiation.

The same phenomena are traced in the process of agamic reproduction, which differs but little from the artificial isolation of parts. Gametic reproduction, Child concludes, is essentially similar in process. He finds no adequate ground for considering the germ plasm a separate entity segregated in its development, but rather "determined like other parts of the body by correlative factors." Hence the germ cells are not immortally young cells, but on the contrary are highly differentiated and therefore physiologically old. In fact they soon die as they mature unless fertilization intervenes. For this is their peculiarity, that the processes of reduction and dedifferentiation must be initiated by fertilization. Rejuvenescence then takes place as in agamic reproduction with the formation of a young organism. This is but one of the interesting problems which this study brings forward. Child finds it much easier to account for inheritance of acquired characteristics if we consider not an isolated germ plasm but the germ cells as an integral physiological part of the organism.

Again, senescence is much more conspicuous in the higher forms because the greater degree of differentiation produces greater stability of the protoplasmic substratum, therefore of the organism, and the progressive changes are not fully compensated by the regressive changes which occur so constantly in lower forms to bring them back to the process of rejuvenescence. In certain forms this frequent regression prevents death altogether; in the highest forms death is inevitable for the parent organism. Rejuvenescence performs its complete work only in the formation of the young individual arising through gametic reproduction.

Perhaps the progress of evolution depends upon a gradual progressive senescence in which each regressive change falls a little short of the previous progressive change. Again, an evolutionary rejuvenescence may have produced certain rapidly developing forms that have marked the course of evolution. These questions bear on our better understanding of evolution and the possibility of our gaining greater future control of it.

JELLIFFE.

MARIE TARNOWSKA. By A. Vivanti Chartres. With an Introductory Letter by Professor L. M. Bossi, of the University of Genoa. The Century Co., New York.

The mission of this book is set forth in Professor Bossi's letter to the author. The first chapter from the author's own hand gives a sympathetic setting for the tragedy that follows.

The tragedy lies no less in the whirl of events that appear irresistibly to sweep Marie Tarnowska down the path of shame and crime, than in the form of the narrative as it pours forth from the lips of the sufferer vibrant still with the madness that has controlled her brain and goaded her to the commission of crime.

The book was published shortly before the release of this unhappy Russian countess from eight years of imprisonment in an Italian prison for instigating the murder of her betrothed. Professor Bossi, understanding the

pathological background of her life, in both physical and mental suffering, requested that the book might be written in order to bring home to its readers the realization of the pathological foundation in most women of criminal behavior, and thus to further the profound service of science in these "darkest regions of moral degradation."

The story fascinates with the rapidly shifting scenes of the life in which the countless moves, even its horrors, sometimes becoming unutterable, weave a spell about the reader. But its real interest lies in the revelation of a suffering soul, weighted by a grievous psychopathic inheritance, early thrust into the whirling vortex of a licentious life, now in revelry, but more often sinking into deepest tragedy. Every attempt to regain the wholesome purity of life she craved seemed thwarted by those about her and by the madness which finally drove her through its delusions to encompassing the death of the man who would have been her saviour as he had proved her true lover and friend.

It is not a tale for the simply curious. It should be read only by those who would understand the psychic causes of the aberrations of human conduct. Then neither pity nor condemnation will confuse the task this narrative lays upon them, to understand and reach the fundamental sources of the conflict which impels even to crime; those things which too often, in the words of the sufferer, are "buried alive" in us and which we are learning to discover at the ultimate foundations in the very depths of the unconscious.

JELLIFFE.

SOCRATES, MASTER OF LIFE. By William Ellery Leonard. The Open Court Publishing Co., Chicago, London.

We know very little of the actual Socrates. We know even less of him than might be learned from a careful winnowing of reports of his life and teaching which we have. These for the most part represent either hostile interpretation or further elaboration of him thought in a system not his own.

Therefore, this author does us a service in presenting the result of a discriminating research among these sources. Out of them he has reconstructed a picture of the whimsical yet kindly personality, devoted to the service of mankind, faithful unto death to the truth as he saw it and to his endeavor to awaken in the highest and the lowest that self-knowledge that he conceived as virtue.

Leonard finds in him a foreshadowing of the transcendentalism later so fully developed by Plato and his teachings never fail to imply a distinct though unformulated religious attitude, however misinterpreted by his contemporaries. But his morality and his religion in large part lay in his practical service to mankind, his disinterested questioning by which he set men thinking and following in themselves that which is good. Something of a psychoanalyst he, in this endeavor to start each man himself to the higher goal of self-knowledge and self-control.

The influence of his personality stimulates yet to-day. We know so little of his teachings that we cannot judge how little he could develop the humanistic implication in his method because held under the conviction and doctrine of the absolute. The author himself, in his task of bringing the man and the thinker from the obscurity that surround him, has left the conclusion somewhat vague. He seems to conceive it a triumph that Socrates can be enrolled under the canopy of the absolute and accredits him even in his "beginning and ending with man," with saving Greek philosophy from the self-slaughter threatening it from the various preceding schools, that of Protagoras with the rest, from which last conclusion we beg to dissent, and would express rather the conviction that with the overthrow of Heraclitus and Protagoras, Greek philosophy sank into an abyss, from which the modern pragmatic and humanistic movements are endeavoring to reclaim it.

JELLIFFE.

LOVE'S COMING OF AGE. A series of papers on The Relations of the Sexes. By Edward Carpenter. Mitchell Kennerley, New York and London.

We do not question the fundamental problems which this book presents. It is true that society needs a regeneration and new adjustment toward sex problems with a broader and more reciprocal relation between man and woman. The author, however, starting with an insufficient understanding of the determinants of human nature that underlie existing conditions, the history of the past and the forces active to-day in sex life in its broadest significance, seeks to deny the still existing need and usefulness of the laws which evolution has produced and fails to see the problem in its true nature and to point the ideal future solution.

His references to the position of woman in the early primitive days of mother-kin suggest an exaggerated conception of woman's position in a society in which even with this custom existing the ideals must necessarily have been low. No less exaggerated is the picture of the "lady" and the "household drudge" of the present time. Not that either of these pictures is untrue, but they can hardly be admitted as typical with the prevalence which he implies, nor is the freedom of woman, without the stigma attached to the term, so impossible or so unrealized a thing as he would assert. It is true that there is much to be desired, especially in adjustment of economic relations where woman's dependence, enforced and sanctioned by social laws and customs, results in the buying and selling of love within or without the marriage bond.

The way to the solution of the problems is a slow one, but can not be hastened by the relaxation of the marriage bonds which Mr. Carpenter suggests, and which have still their purpose to sustain. It is not a loosening of restraints and an expansion on the vitalistic levels that society needs, but the slow but inevitable process of reëducation and broadening and transformation of energies into activities racial in purpose and effect in the higher spheres, and these will in turn purify and re-adjust the individual life. The author insists, to be sure, on the raising of love to the spiritual plane, but lacks a clearness of understanding of the reproductive force in its variety of manifestation and the real process of sublimation into the productivity that reality demands.

This is evident in his discussion of "the intermediate sex" where he fails to distinguish clearly between the pathologic over-development of natural characteristics present in every individual and their successful transformation into social relationships. He seems to miss the fact that here too individual training and education must control the "homogenic" tendency and direct it to the normal, well-adjusted sexual life where there need be no "intermediate sex."

The book treats problems that must confront us, but neither its foundations nor its aims are comprehensive enough to find the broadest and most truly progressive solution.

JELLIFFE.

The Journal OF Nervous and Mental Disease

An American Monthly Journal of Neurology and Psychiatry Founded in 1874

Original Articles

OBSTETRICAL PARALYSIS¹

BY JOHN JENKS THOMAS, A.M., M.D., AND
JAMES WARREN SEVER, M.D.,

BOSTON

In an article published by one of us in 1905² a résumé of the views of the causation of obstetrical paralyses in the infant was given, and the article of Stransky, in 1902,³ gives a very complete bibliography of articles written on the subject up to that time. Briefly let us state that while mentioned before, the first adequate description was that given by Duchenne in 1872. He ascribed the paralysis to pressure of the forceps, or of the finger in the axilla. Two years later, Erb called attention to the grouping of the affected muscles being the same as in the adult cases of injury of the plexus, and that these particular muscles could be stimulated together by electricity applied at a particular point near the clavicle, since known as Erb's point. Erb ascribed the injury, in the obstetrical cases, to pressure of the fingers at this point, especially when the Prague-grip with the fingers hooked over the shoulders to facilitate the delivery of the aftercoming head in breech cases was used. Roulland, Seeligmüller, Jolly, Dauchez, Gowers, Peter and others were inclined to give the rôle in the pathogenesis to pressure on the nerves from the fingers or forceps upon the plexus.

Thorburn, in 1886, suggested pressure on the plexus by the clavicle as the cause of the injury of the nerves. Walton also

¹ Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

² Thomas, J. J., Two Cases of Bilateral Birth Paralysis of the Lower Arm Type, *Bost. Med. and Surg. Journ.*, 1905, CLIII, 431.

³ Stransky, E., Ueber Entbindungslähmungen der oberen Extremität beim Kinde, *Centralbl. d. Grenzgeb. Med. u. Chir.*, 1902, V, 497.

thought this possible in some of the cases. Arens, in 1889, ascribed the injury to hemorrhage, or tearing of the nerves. In this country, Carter, in 1892, was the first to clearly ascribe the injury to stretching of the plexus, and Walton considered this the most frequent cause. Peter also admitted this as the cause, especially when there was strong lateral bending of the head, with delayed delivery of the shoulders, or turning of the head as in breech cases. Guillemot also considered the pulling as the essential cause, as did Plauchu and Bollenhagen.

Robinson in 1899 reports 17 cases, in only one of which there was normal birth; all others were difficult and tedious. He quotes J. C. Stimpson as having shown heads of boys are larger than girls, and therefore the heads of the latter do not dilate the way for the shoulders as well as the former. Of his own series, 13 out of 17 were girls.

Fieux, in articles published in 1896 and 1897, was apparently the first to report experimental work. He rejected the idea of possible pressure of forceps upon the nerves, or from the finger, arguing that the pressure would have to be too sharply localized to injure Erb's point for it to be possible for the trauma to arise in this way. He also was unable to produce pressure on the plexus by the clavicle against the spine. He finally came to the conclusion that traction alone could produce the injury; this being to the upper roots as a rule because these form the longest side of the triangle, and lateral inclination of the head aids by increasing the distance. He states that the plexus can be torn in this way, and in favor of stretching, adduces a case of his own where the midwife had produced the paralysis by pulling down hard on the head to deliver the shoulder. He produced paralysis of the fore-leg in rabbits by pulling the head strongly to one side. He states that the paralysis in infants is most apt to affect the anterior shoulder, that is, the one presenting at the pubes.

Schoemaker also experimented with the cadaver and phantom, and with the plexus exposed was able to tear the fifth and sixth cervical roots, but almost never the seventh and eighth. Schoemaker also thought injuries of the plexus could arise from pressure of the clavicle against the spine or first rib, according to whether the shoulder was depressed, or raised and pressed back. He thought he could produce pressure over the plexus by forceps if the head were much flexed or extended. Laudolet also did some experimental work. Stolper, in his experimental work, also with the cadaver and phantom, arrived at much the same result as Fieux and

Schoemaker. He also considered compression by the clavicle against the spine as a possible cause of injury.

For anatomical findings, Danyou found hemorrhage about the plexus near the spine. Fritsch also found hematomata, and Seeligmüller the same about the plexus. Eversmann at autopsy found a tear of the brachial plexus at Erb's point. Phillipe and Cestan found a rupture of the nerve roots. Oppenheim found a degeneration of the fifth and sixth roots. Dauchez, at autopsy, found injection of some of the branches of the plexus.



FIG. 1. David S. Before operation; showing amount of elevation possible.

Küstner also found a hematoma. All was not unanimity however. Küstner, in 1888,⁴ called attention to injuries of the bones. He found fracture of the clavicle the most frequent, but dislocation of the shoulder rare, because of the lack of firm union between epiphysis and diaphysis in infants. The consequence of this is that what usually occurs is a separation of the epiphysis, and he thought this injury the rule in the cases of obstetrical paralysis. This view was contested by Köster.⁵ The next important article on the subject containing original work in relation to the etiology of this condition

⁴ Ueber die Verletzungen der Extremität des Kindes bei der Geburt. Volkmann's Samml. klin. Vorträge, A. F. No. 167.

⁵ Ueber Entbindungslähmung, Deut. Arch. f. klin. Med., LVIII, —.

was that of Clark, Taylor and Prout in 1905. The conditions found by Dr. Taylor in his operations, of thickening of the part of the plexus where the fifth and sixth cervical roots unite, and the cases of rupture of the plexus can be interpreted only on one basis, that of trauma, in some way localized at that point. These writers were firmly convinced of the truth of the theory of the origin of these paralyses from a stretching of the plexus.

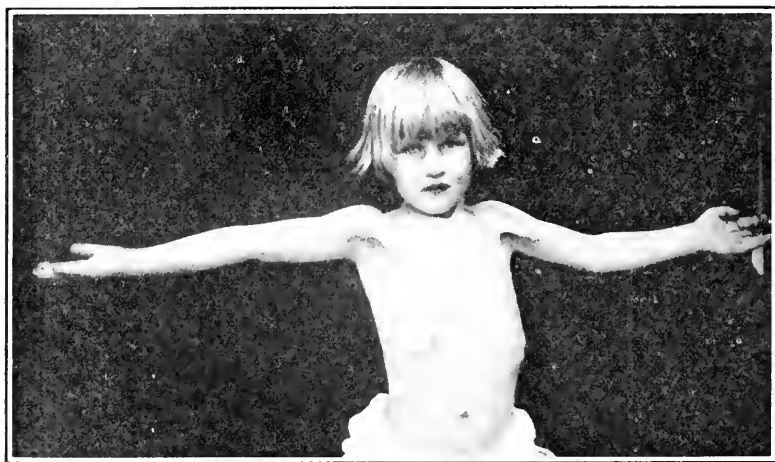


FIG. 2. David S. Five months after operation; showing amount of supination, and gain in external rotation of the humerus.

Bullard, in 1907, also gave his adherence to the theory of stretching of the plexus being the essential factor, and called attention to the fact that rotation of the head to the opposite side and oblique traction on the head, both elements that enter into the mechanism of delivery, especially of difficult ones, all add to tension on the plexus, and that asphyxia with its relaxation of muscles is a favorable condition.

Taylor, writing in 1908, also believes the cause is tension of the plexus, and supports his opinion by the results of dissections and experiments on infant cadavers. The overstretching is caused by forcible separation of the head and shoulder in vertex presentation, by pulling on the head, and in breech presentations by pulling on the shoulders. He reports a case of his own where during the delivery of a breech case, he felt the roots of the plexus tear under his fingers, which was later confirmed by autopsy.

Osterhaus, Bailey, and Frazier and Skillern all accept traction as the cause.

Lange, in 1912, advanced a theory that this form of paralysis is due to a tearing of the capsule of the shoulder joint, which at first limits motion because of pain, and thus a habit is formed of holding the extremity in a certain position of internal rotation. He reasoned from the condition found about the shoulder joint after dislocation in certain adult cases, and argued that the same condition existed in the obstetrical paralysis of children. In all he reports 17 instances in 15 patients. Details of all of these are not given, but apparently the youngest was 7½ months, and none were in young infants. In 13 of his cases he could make out no actual paralysis of muscles, and X-ray examination showed no fracture or separation of the epiphysis. He emphasized this because of the views of Küstner. If there were separation, internal rotation should be increased, which is not the case, and also the relation of the tubercles to the condylar axis should be altered, while in his cases this was normal. He also ascribes the flexor contracture at the elbow occasionally seen to distortion of this joint at birth, and explains the weakness of extension of the wrist to disuse. On 11 of his cases he has done 8 osteotomies, as has been done by Hoffa, but admits that this lessens active internal rotation. In one instance in a 7½ months' child, in which the deltoid was not affected, he operated upon the plexus in the axilla, and found cicatricial tissue about the nerves. At the time of reporting the case only two months had elapsed, so the final result was not known.

T. Turner Thomas was perhaps the first advocate of this theory in this country. He based his opinion on nine cases of this trouble, all too old for study of the condition at the time of injury. He believes there is a laceration of the capsule from forced abduction of the arm during birth, and the internal rotation is due to pain, and later from contraction of the capsule. He amplifies the theory of Lange by postulating an involvement of the nerves in the axilla by a perineuritis which is secondary to the injury of the capsule. He argues that a scapulo-humeral limitation of movement is nearly always present in those cases diagnosed as traumatic brachial paralysis, and if various nerve symptoms which occur could be accounted for on the basis of the conditions existing in the axilla, a long step would be taken in the direction of clearing up the pathology, and we need not assume a direct trauma to the terminal branches of the brachial plexus, the plexus itself or its roots to account for them. He thinks subacromial dislocations of the humerus are frequent and are overlooked.

It cannot be doubted that dislocations of the shoulder may occur

during birth, and apparently the 3 cases reported by Finck were of this nature, where in children, 63, 92 and 17 days old, the apparent paralysis disappeared in 5 days, 2 weeks, and 3 weeks respectively after putting the arm up in external rotation and abduction at the shoulder. While it is true that dislocations occur, it by no means follows that this condition would be overlooked by almost every one, especially where dislocations, separations of the epiphyses and fractures have been suggested as the true causes of this paralysis so

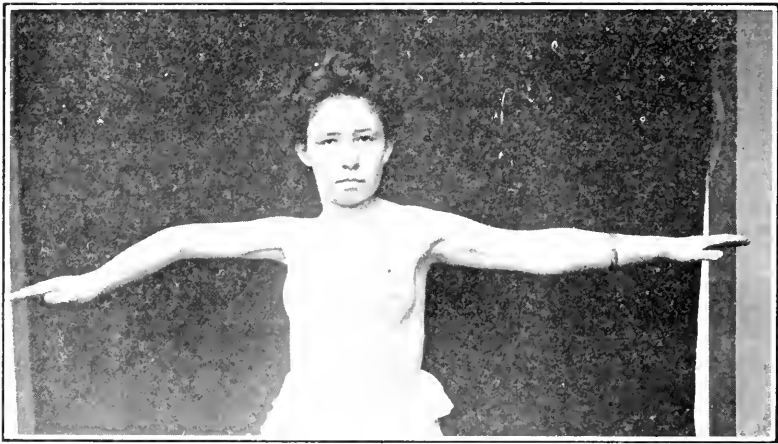


FIG. 3. Gertrude C. Old case. Showing marked absence of external rotation of humerus, and imperfect supination.

many times through a number of years as we have seen. In the first place such a theory leaves out of account the numerous cases where injury of the plexus at Erb's point has been found at operation, as by Kennedy, Taylor, Sharpe, and others, or at autopsy, as in a number of instances, and the theory that no paralysis is present, but that loss of motion is due entirely to inhibition through pain, leaves unexplained a number of important things, such as the inequality of the pupils, and the narrowing of the palpebral fissure, the signs of injury of the cervical sympathetic which is seen in many cases where the lower nerve roots of the plexus are involved in the injury. Then, too, the marked atrophy of the muscles affected, marked in the upper arm and shoulder, with little in the forearm, such as is seen invariably within the first two weeks of the injury, as must be noted by those who have the opportunity of seeing cases in the early weeks, as we have, cannot be ascribed purely to disuse, in spite of the fact that the variability of the electrical reactions in infants prevents the absolute proof that might be obtained by finding the reaction of degeneration as in the case of adults.

The theory that the nerves are injured in the axilla leaves out of account the known arrangement of fibers in the brachial plexus, where alone the peculiar grouping of the muscles affected can be found, if we leave aside the segmental diseases in the spinal cord. Indeed, this resemblance of the grouping to that in the spinal cord led Burr to suggest an infantile poliomyelitis as the cause. The muscles generally found affected in the Erb, or upper arm type of obstetrical paralysis are the deltoid, supra- and infra-spinati, biceps,



FIG. 4. Gertrude C. Six months after operation. Marked gain in external rotation of humerus, and considerable improvement in supination.

brachialis anticus, and supinators, all of which muscles are supplied by fibers coming from the 5th and 6th cervical nerve roots. At times the paralysis may involve the teres major and minor, the latissimus dorsi and the lower trapezius. Where the extensors of the wrist and fingers are involved, we usually find the history of a total arm paralysis at the first, with no movement of the fingers, and subsequent improvement, which indeed is at times the case in instances where the extensors of the wrist show no weakness. Any injury of the lower part of the plexus in the axilla fails entirely to account for the practically invariable paralysis of the spinati muscles, which are supplied by the supra-scapular nerve, which arises from the plexus at the junction of the fifth and sixth cervical roots, nearly two inches above the axilla, as measured along the cords of the plexus in an infant cadaver. This also cannot account for paralysis of the supinators supplied by the musculo-spiral nerve, with the escape of the triceps and the other extensor muscles in the forearm which are supplied by the same nerve, as this nerve has already separated from the plexus at a point opposite the anterior portion of

the capsule of the shoulder joint. Dr. Turner Thomas suggests a seeping up along the cords of the brachial plexus of the hemorrhage in the loose tissues of the axilla from a rupture of the capsule. Because of this suggestion, one of us (Dr. Sever) has carried out numerous dissections on infant cadavers in the Laboratory of Surgical Pathology of the Harvard Medical School by the courtesy of Dr. E. H. Nichols, the Director. In several infants the shoulder joint was injected with methylene blue and a rupture produced in

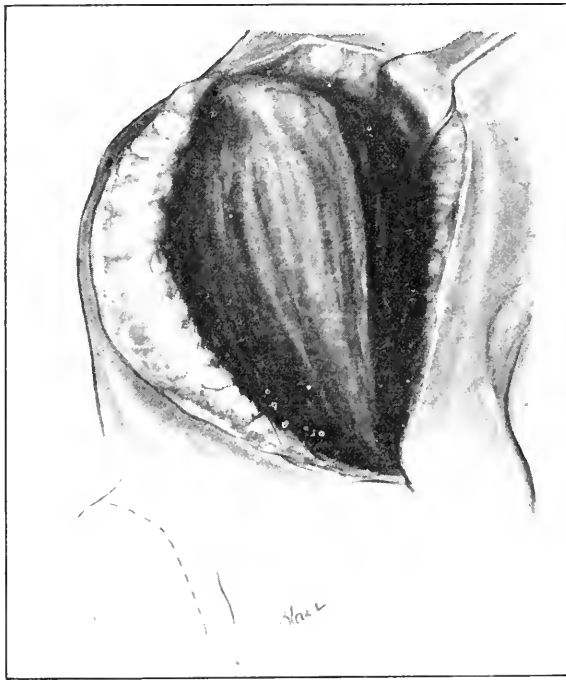


FIG. 5. Operation. Showing line of incision, and division of fibers of deltoid.

the anterior portion of the joint capsule. The cadavers were left lying on their backs for several weeks and then dissected. In no instance had the staining fluid gone above the clavicle, but had merely stained the parts about the nerves in the axilla only. The fluid had shown no tendency to follow the nerve trunk towards the spine in the direction of Erb's point. Of course, while this does not exactly reproduce the conditions of a hemorrhage at a similar point in a living child, it was as near to this as we could devise.

Just as Küstner laid emphasis on injuries of the joint, so others,

more especially recently, have called attention to deformities, not only of the shoulder, as subluxation of the head of the humerus backward, but also hooking down of the acromion, and deformities at the elbow, or an increase of the curve of the coronoid process, which prevents full extension of the elbow, and forward dislocation of the head of the radius, preventing full flexion at this joint. Küstner mentions most of these conditions, and Stransky recognizes them as late secondary conditions.

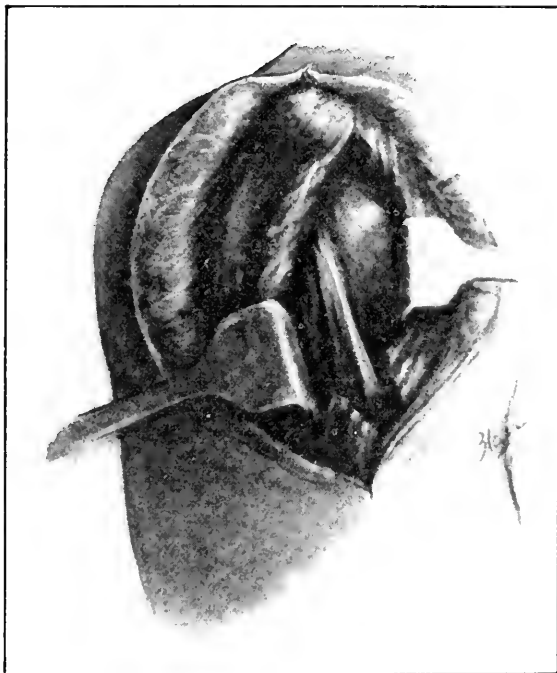


FIG. 6. Operation. Showing cut pectoral, and the short head of the biceps exposed.

Bullard was perhaps the first to give a careful study of these deformities with X-ray examination. In our studies we have had X-ray plates made of 109 of our cases recently observed, of which we shall speak later.

Peltesohn describes, in 1914, a number of cases which he calls "false birth palsies," which he states are due to injuries of the upper epiphysis at birth. This term of false birth palsy has been used by Dauchez in 1891, as also by d'Astros.

Gaugele, in 1914, also claims that in obstetrical paralysis there is no true paralysis, but the condition is due to an injury of the

capsule and soft parts with subsequent contractures. He also says that injuries of the epiphyses and other injuries are not uncommon. He reports only four cases.

Van Neck, writing in the same year, believes that other conditions may simulate obstetrical paralysis, such as epiphyseal injuries of the head of the humerus, congenital developmental defects of the plexus, and the results of tears of the capsule of the shoulder joint. He states that these all present definite clinical pictures, and by X-ray and careful clinical examination the diagnosis should be made, and the cases not confused with obstetrical paralysis.

Darling, in 1915, in a study of various lesions of the brachial plexus, in a discussion of various theories, accepts one based on definite nerve pathological examination, and believes that traction on the cords of the plexus is the generally accepted theory in view of all the clinical and experimental evidence.

Let us mention here some further results of the dissections done by one of us (J. W. S.), of which we have just spoken. With traction and forcible separation of the head and shoulder it was easy to put the upper cords of the brachial plexus under marked tension. This was so great that the upper cords were as tense as the strings of a violin. It was also found that by forcible abduction and elevation of the arm at the shoulder, the lower cords of the plexus, especially the eighth cervical and first thoracic roots, were put upon the stretch, so that evidently much force applied in this way might produce rupture or other injury of these roots. This condition probably would occur only in breech presentations, where the arms are extended. With the shoulder held, and the head carried to the opposite side, when the clavicle was intact, it was found that considerable force was necessary in order to injure the plexus. The supra-scapular nerve always snapped first, apparently because it had less freedom of movement than the others. Even with considerable force, the fifth and sixth roots could not be completely torn across at Erb's point, but frayed inside the sheath, following a partial tearing of the sheath, which always gave way first. In some cases there could be produced an evulsion of these roots from the spinal cord.

With the clavicle removed, less force had to be exerted, and the injury was usually greater in extent, but the general character of it was the same. In all the dissections there seemed to be sufficient space under the clavicle to exclude pressure upon the plexus from this source. Rotation of the head did not seem to increase the tension appreciably.

In no case, using the full force of the hands, could a rupture of the capsule of the shoulder joint be caused, nor separation of the epiphysis, nor a dislocation of the head of the humerus. The clavicle could be broken without the use of much force, but fracture of other bones which enter into the formation of the shoulder joint proved practically impossible. Stone reported that the epiphyses

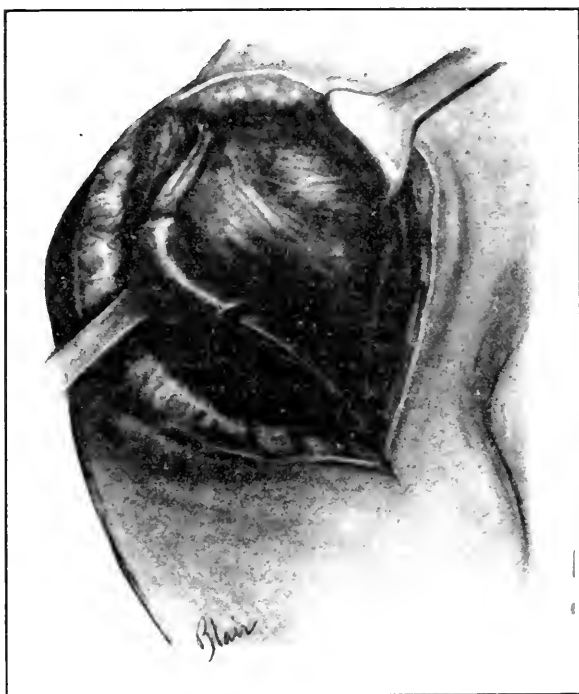


FIG. 7. Operation. Showing capsule of shoulder joint, and insertion of subscapular tendon.

could easily be separated from the shaft of the humerus, but this could not be confirmed in this work. At birth the shaft of the humerus is nearly wholly ossified, but the two extremities are still cartilaginous. The scapula is largely osseous with the exception of the glenoid fossa, coracoid, and acromial processes, and the posterior border and inferior angle which are still cartilaginous.

The conclusions of this paper are based upon the study of 471 cases observed by one or both of us in the neurological clinic of the Children's Hospital, as well as upon certain experimental work.

An analysis of these cases is given in Table I.

TABLE I

Boys	235	Right	272	Upper	400
Girls	236	Left	186	Lower	64
Total	471				
Both arms	9			Upper	2
				Lower	1
		Labor			
			Difficult	418	
			Ether	363	
			Forceps	317	
			Normal	32	
			Asphyxia	102	
		Presentation			
			Head, including face	219	
			Breech, including foot and version	66	
			Position not known	185	
			Total	471	
			Fractured clavicle	14	
			Arm broken	3	
			Cord around neck and arm	2	
			Cord around neck	2	
			Pupils unequal	16	

An analysis of this table may be of interest. In the first place there is no reason to expect any difference in regard to the sex unless one is ready to accept Simpson's theory that girls' heads being smaller and so not dilating the canal sufficiently, would subject them to a more difficult labor, and so to a greater per cent. of occurrence of injury to the brachial plexus. These figures representing by far the largest number of cases so far reported, and out-numbering all others reported by all observers, do not confirm his theory.

The right arm was affected 272 times, and the left 186, about 68 per cent. in favor of the right arm. This bears out Sharpe's figures in his series of 50 operative cases. Nine of our cases had both arms affected.

The types of paralysis differed, the most usual one being the so-called upper arm type, 400 of this type being recorded as against the so-called lower or whole arm type where besides the fifth and sixth cervical roots being injured, the seventh and eighth cervical and first dorsal are damaged. Of this type, 84 cases were recorded. The nine cases which had both arms affected showed generally the lower or whole arm type of paralysis.

It has been conceded by practically all authors that a difficult labor was a predisposing factor in the causation of paralysis. In this series, 418 cases were definitely recorded as long, laborious, and difficult; 363 at least had ether and 317 had forceps used; 32 were

apparently normal labors; and 102 were recorded where the child was asphyxiated. All the conditions noted above imply the application of force combined with great muscular relaxation of the child, conditions peculiarly favorable for the production of such an injury. A moderately large number, it is recorded, had the head delivered naturally but that the "shoulders stuck," and at that time force was applied.

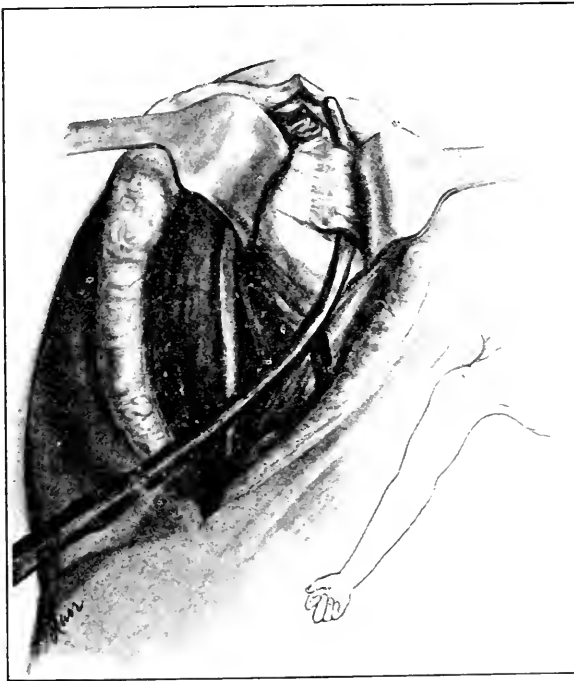


FIG. 8. Operation. Showing sound inserted under the tendon of the subscapular muscle. Note that the arm is abducted and outwardly rotated.

In regard to the presentations, 210 at least were vertex or face presentations, and 66 were breech, which latter classification includes versions and footlings. In 186, the position was not recorded, but a large majority of these were undoubtedly vertex. These figures do not bear out either Tubby or Sherren (quoted by Fairbank) who state that the paralysis occurs equally in head or breech presentations. Fairbank's own figures refute this also, for he reported in 40 cases 32 vertex presentations and 7 breech. These figures cover 285 cases of the writers where the presentation was definitely known.

The other conditions occurring at birth may be noted in the table and we may add a word about one of them, namely, that of unequal pupils. This condition is probably overlooked in some cases, and is a most important symptom, in that through injury to the cervical sympathetic, it proves a definite injury to the plexus, either of the lower cords, the eighth cervical, or first dorsal, which have communicating branches with the cervical sympathetic, or injury in the spinal cord itself, to the fibers of the sympathetic system. The prognosis in these cases is usually not as good as in those which do not show this sign, probably because this injury of sympathetic fibers usually occurs by rupture of nerve roots close to the spine, which must be the case as the motor sympathetic fibers leave the nerve roots very close to the spine, and this symptom of involvement of the sympathetic does not occur in disease of the lower cords of the plexus, if situated further from the spine.

X-RAY EXAMINATIONS

Of the recently observed 170 cases of obstetrical paralysis, 109 have had X-rays taken of both shoulders on one plate. These cases have varied in age from two days to eighteen years. In two cases only had there been fractures; one of the clavicle, and one of the upper third of the humerus. Both had healed without incident. These cases have been tabulated under the following headings in relation to their ages at the time the X-rays were taken.

TABLE I
X-RAY TABLE

Age	Subluxation Joint	Acromial Deformity	Elevation and Outward Rotation of Scapula	Joint Appearing Normal
2 days to 1 year	11	—	16	15
1 year	6	3	7	5
2 years	5	1	5	5
3 "	4	3	5	4
4 "	4	4	6	4
5 "	6	6	6	—
6 "	3	4	5	2
7 "	5	3	6	—
8 "	2	1	3	—
9 "	4	4	4	—
10 "	3	3	3	—
11 "	2	2	2	1
12 "	1	1	1	—
13 "	2	1	2	—
14 "	3	2	3	—
15 "	1	1	1	—
16 "	1	1	1	—
17 "	—	—	—	—
18 "	1	1	1	—

A study of the X-rays taken in these cases shows the following conditions:

In the first year there is usually nothing seen of bony deformity. There may be a slight posterior subluxation of the shoulder joint, but there is never any acromial deformity evident, by X-ray or clinically. No case has been observed where the epiphysis has been displaced as far as could be seen by comparison with the normal shoulder. The epiphysis as well as the shaft of the humerus in older children is always smaller than on the unaffected side, which condition is undoubtedly due to atrophy from disuse.



FIG. 9. Girl about 17 years. Note acromial hooking, with posterior subluxation of head of humerus, and elevation and outward rotation of scapula, with atrophy of articular head of the humerus.

The scapula is practically always elevated and outwardly rotated, due apparently to the pull of the intact inward rotators and the levator anguli scapuli.

As time goes on and the child gets older, one begins to see increasing evidence of bony deformity; occasionally more joint subluxation than at first, increasing outward rotation and elevation of the scapula, and acromial deformity. The deformity of the acromion consists of a bending downward and forward, or hooking of its outer end, which apparently having no bony resistance to meet as normally in the head of the humerus, projects downward in front of

the subluxated and inwardly rotated head. This hooking seems to vary directly with the degree of posterior subluxation and inward rotation, and tends to increase as the child grows older.

No case has been observed where there has been a total subluxation or dislocation of the shoulder joint backwards. The clavicle usually is shorter, and its curves are more acute than its normal fellow.

Our conclusions, based upon our study, which in many instances includes the examination of the child in the first few days of life, are very definite that obstetrical paralysis is due to injury of the brachial plexus, in the great majority of cases from stretching, if this is not the only method of producing the injury; that our clinical facts, the anatomical facts, and experimental work all exclude the possibility of its being produced by dislocation of the shoulder, or injuries of the capsule of this joint, or separation of the epiphyses.

In making this statement, we by no means wish to be understood as claiming that such accidents do not happen and thus produce a condition which we may call a pseudo-paralysis, but in the great majority of instances we should suspect that like fractures of the clavicle, they are complicating conditions due to the difficult labor, and accompanying the injury of the plexus. These theories of local injuries as the cause, judging from a study of the original articles of the writers, seem to have been based in general if not always upon older cases of obstetrical paralysis, and inferred from a condition which we have repeatedly seen develop under our eyes in cases where when seen soon after birth, there was not the slightest indication of these supposed causative factors. To one who has seen the condition of limited motion at the shoulder in abduction and external rotation, and a backward subluxation gradually appear after months or years in cases while actually under observation, the conclusion is inevitable that these conditions like the forward displacement of the head of the radius, are purely secondary late conditions, in cases where they have not existed from birth; and therefore only conclusions as to the condition of the shoulder joint based upon clinical and X-ray examinations during the first few days of life are of any value in diagnosing injuries of this joint.

The paralysis of the external rotators, as one of us (J. J. T.) has remarked in a previous paper, allows strong inward rotation of the humerus by the unaffected subscapular muscle, and most of the later disabilities of movement observed except that of supination of the forearm, are due to the absence of external rotation of the humerus. In older children, and especially in neglected cases, there

is not only an absence of external rotation of the humerus, but also an obstruction to its passive performance, which seems due to secondary contracture of the subscapular muscle. In many cases there is also prevention of free abduction and elevation of the arm, which is in greater part due to this same contracture, but aided by shortening of the humeral portion of the pectoralis major.



FIG. 10. Girl about 17 years. Right arm. Marked acromial hooking in front of head of humerus, with posterior subluxation of the humerus. Note elevation of scapula, especially inner superior angle.

The treatment of any condition depends not only upon a knowledge of the causes producing it, but an accurate estimation of the varying condition resulting in the individual case from those causes. Our work at the Children's Hospital has led us to feel very strongly that there is no routine method of treatment applicable to all cases of obstetrical paralysis, but that methods must be varied to suit the individual case, and of the case at various times in its course. We shall therefore speak rather briefly of some forms of treatment, and at greater length of others. We may divide the treatment into medical, or more properly physiological methods, which aim at restoration of function in the affected muscles, and surgical. The latter,

however, must again be divided into those which aim at restoration of function in the injured nerve trunks, and those designed to obviate or lessen secondary conditions which have arisen.

First, let us speak briefly of operation upon the plexus. Theoretically, this is the ideal method, as it aims at restoring the function of the injured nerve trunks. If seen in the first few days after birth, by operation one can remove a hematoma lying about the brachial plexus. Our experience, however, has taught us that this condition is rarely present. This operation should be considered in cases with total paralysis of an arm, if seen immediately after birth, and especially if local evidence of such a hematoma is found as tumefaction above the clavicle, or discoloration of the skin in the region of the plexus. In those cases where what may be looked upon as an exploratory operation is done, we can also resort to longitudinal slitting of the sheath of the cords of the plexus if they are found swollen, or other evidence of hemorrhage within the sheath can be made out. Primary suture of the nerve trunks when these are torn should be done at this exploratory operation if this is possible, or implantation of torn trunks into neighboring ones if suture be impossible. Resection of apparently injured portions of the plexus and suture after this is, in our opinion, always unwise at an operation in the first few weeks. This is largely because we have failed as yet to see a single case of total paralysis of the arm in which there was not later spontaneous improvement of a large number of muscles where operation had not been done, and this improvement often came only after a good many months, and occasionally after a year and a half or even two years. Generally, this spontaneous improvement leaves either the lower arm group of muscles affected or the upper arm group, though in a good many instances mixed forms were the result, resembling the typical grouping but not exactly, as an upper arm group with involvement of the extensors of the wrist, fingers, and thumb. Another and weighty reason for avoiding early resection of the plexus aside from the practical impossibility to decide what part of the plexus is permanently damaged, is the well recognized fact of the imperfect repair after such resection of a plexus, even in favorable cases, as compared with the results of suture of peripheral nerves.

Late resection of the plexus stands on a different footing, provided enough time has elapsed to enable one to determine what muscles are permanently damaged. The practical difficulty is in deciding how long one should wait for the spontaneous improvement to appear, and after what period of time does the prospect of

nerve regeneration become too small to warrant such interference. Our experience with plexus operations leads us to feel that resection should not be considered under the age of six months, and in most cases in not less than twelve months, while eighteen months is not at all too late. The extreme length of time when nothing can be hoped from resection of nerves is difficult to place, but it seems probable that after two years the prospects of regeneration grow less rather rapidly, and after eight years one is not warranted in expecting much of any prospect of restoration of function through such a procedure.

In cases where operation upon the nerve trunks is considered inadvisable for any reason, or is refused when advised, what methods should be used is the next question. At the Children's Hospital for a period of over twenty years, we have used and gradually developed a system of treatment which we may describe as re-educational exercises. This is based upon the fact that in almost all cases the paralyzed muscles recover in so far as regards the power of voluntary control, but this is gradual, and the muscles affected remain permanently weaker than normal, and in case they are opposed by unaffected muscles, contractures gradually form, as they do in the unaffected opponents of paralyzed muscles in cases of anterior poliomyelitis. Beginning from the first, the attempt is made to prevent the formation of these contractures by passive movements. To these are gradually added active movements, first aided, then unassisted through the appeal to the child by imitating movements of the well arm, and then through games, as if measuring ribbon, and a great variety of play movements have been devised by Miss Colby, for many years in charge of our exercise work. These exercises are also supplemented by massage to improve the nutrition of the muscles and the growth of the affected limb. These educational exercises have been described in more detail by one of us (J. J. T.) in a previous article. We may add that in our experience, with the average case it is rare to find contractures forming when this treatment has been instituted early, and continued faithfully.

In many cases of the upper arm type, even of considerable severity, if this treatment is followed up with sufficient care during the whole of the period of growth, it proves to be all that is needed. In some cases, however, in spite of the treatment, or because it is not persisted in steadily enough, or long enough, or is instituted too late, while some improvement is seen, it is not great, and considerable disability persists. In these cases of the upper arm muscle

group type, the two remaining difficulties are in supination of the hand, and external rotation of the humerus, and in some of the cases elevation of the arm. On examination of these cases, one finds almost invariably a limitation of external rotation at the shoulder and in abduction of the humerus, without motion of the scapula. This is due to contractures, most marked and earliest in the subscapular muscle, but later in the pectoral, and at times the teres major and minor. In older cases, it will be found in a good



FIG. 11. Marie K. Baby. Shows marked outward rotation of scapula, and some subluxation of joint.

many cases that there is a partial displacement of the head of the humerus backward, occasionally forward however, and less often a bending down of the tip of the acromion. This is the most usual form of the late deformity from contracture, but at times others are seen, as forward dislocation of the head of the radius preventing full flexion of the forearm at the elbow, and more often a limitation of passive supination of the forearm. If these contractures are firm, it is difficult to overcome them by stretching by passive movements, even if these are carried out daily, and where gain has been made, they recur quickly. We have endeavored to overcome these contractures by continuous stretching, putting the arm in external rotation and abduction at the shoulder, with supination of the fore-

arm. This has been done by plaster of Paris which is carried well down about the trunk and split to form a trough for the arm and forearm, and at times the hand; the arm is then bandaged to the splint and thus kept in the position desired. The apparatus is removed each day for the carrying out of massage and the exercises. By this method we have generally obtained improvement, but again in older cases in which the contractures were firm, we have been unable to gain as much freedom of motion as was needed, and in many cases the improvement was rather quickly lost when the apparatus was omitted. To overcome this difficulty, the following operation has been devised, modified somewhat after the one described by Fairbank. An anterior longitudinal incision is made on the anterior aspect of the shoulder, extending from the clavicle to the lower border of the pectoralis major. The cephalic vein is found, and either divided and tied or pulled to one side, the incision is then carried down between the deltoid and the clavicular portion of the pectoralis major, which exposes the long head of the biceps in its groove, and the short head of the biceps and coraco-brachialis to the inner side. A blunt dissector is then passed under the tendon of the pectoralis major, which is divided near its insertion. Following this there is usually perfect abduction of the arm, but not free outward rotation. There is also better exposure of the joint capsule. It is not necessary to open the sheath of the long head of the biceps. With the arm now abducted and outwardly rotated, the transverse fibers of the tendon of the subscapular muscle may be seen, as they are inserted into the lesser tuberosity of the head of the humerus intimately associated with the joint capsule. With good retraction a clear field may be obtained, and it is then possible with a blunt dissector, or as we have been accustomed to use, a no. 18 F. sound, to pass this under the tendon of the subscapula and divide it freely. This procedure is followed by free outward rotation and in most cases where there is no acromial hooking, by a reduction of the subluxation. It is not necessary or wise to open the joint capsule.

In certain cases, which still offer resistance to full outward rotation, it has been found necessary to divide partially or wholly the short head of the biceps, and in one case the coracoid process was separated with an osteotome.

If it is necessary to do an osteotomy on the acromion, it may be done through the same incision by extending it upward slightly.

The edges of the pectoral and deltoid are then stitched loosely together by interrupted sutures of no. 1 catgut and the skin closed

by no. 1 continuous catgut. The arm is then put in a plaster cast, extending from the ilium to the finger, the arm being elevated at the shoulder, bent, fully rotated out, and the hand supinated.

Too long fixation should be guarded against, and massage, baking and manipulation should be begun by the end of the second week, at which time a wire splint may be substituted for the plaster.

The operation is simple, there is very little bleeding, and the results are good, provided the capsule has not been opened nor the period of post-operative fixation been too long.

After the carrying out of this process of stretching, or of the operation upon the contracted muscles, it is of the greatest importance that the exercises should be carried out steadily for a long time in order to develop the strength of the weak muscles, and so give ease and facility in the proper use of the arm. One can hardly lay too much stress upon the need of this after treatment, which, according to our experience, should be begun rather soon after the operation, as has been said, and also upon the need for persistence in its use till the tendency for reformation of contractures is past. If the object of this operation is borne in mind and the cases in which it is needed are selected according to the individual condition found on examination of the case, we feel convinced that others will find it of great use, as we have done, and often be surprised at the marked improvement obtained in such motions as that of supination, which one would have hardly expected to be altered very greatly by obtaining freer movement in outward rotation at the shoulder joint.

REFERENCES

- For references before 1912 see article of Stransky.
 Bailey, P. Brachial Birth Palsy. *Bull. Lying-In Hosp., N. Y.*, 1918, iv, 119.
 Boyer, G. F. The Complete Histo-patholog. Exam. of the Nerv. System of an Unusual Case of Obstet. Paralysis, Forty-one Years after Birth. *Proc. Royal Soc. Med.*, 1911-12, v, Part 2, Neurol. Sect., 31.
 Bullard, W. N. Obstetrical Paralysis. *Am. Jour. Med. Sc.*, 1907, n.s., cxxxiv, 93.
 Clark, L. P., Taylor, A. S., and Prout, F. P. A Study of Brachial Birth Palsy. *Am. Jour. Med. Sc.*, 1905, n.s., cxxx, 670.
 Darling, H. C. R. *Med. Jour. of Australia*, October 9, 1915.
 Eversmann, J. Beitrag zur Frage der Aetiologie der Entbindungslähmung in oberem Extremität. *Arch. für Gyn.*, 1903, lxxviii, 143.
 Frazier and Skillern. Supraclavicular Spontan. Lesions of the Brach. Plexus, not assoc. with Skeletal Injuries. *Jour. Am. Med. Ass.*, December 16, 1911, lvii.
 Fairbank, H. A. T. Obstet. Paral. Operation on the Brach. Plexus. Subspinous Sublux. of the Shoulder Joint in Infants and Young Children. *Clin. Journal, London*, 1912, xl, 109.
 — Birth Palsy. Sublux. of the Shoulder Joint in Infants and Young Children. *Lancet*, 1913, i, 1217.
 Gangele, K. Ueber die sogenannte Entbindungslähmung des Armes. *Zeitsch. f. Orth. Chir.*, 1914, xxxiv, 511.

- Kennedy, R. Suture of the Brachial Plexus in Birth Paralysis of the Upper Extremity. *Brit. Med. Jour.*, 1903, i, 298.
- Further Notes on the Treatment of Birth Paralysis of the Upper Extr. by Suture of the Fifth and Sixth Cerv. Nerves. *Brit. Med. Jour.*, 1904, ii, 1065.
- Anastomosis of the Brachial Plexus. *Proc. of the Royal Soc.*, 1915, Series B, lxxxviii, 94.
- Lange, F. Die Entbindungslähmung des Armes. *Münch. med. Wochenschr.*, 1912, lix, 1421.
- Osterhaus, K. Obstetrical Paralysis; A Prelim. Report of Two Cases Treated by Nerve Dissociation. *N. Y. Med. Jour.*, 1918, lxxxviii, 887.
- Peltesohn, S. Ueber die Geburtslähmung kompliz. Verletz. in Bereich des Schultergelenks. *Zeitschr. f. Orth. Chir.*, 1910, xxvii, 391.
- Ueber Verletz. des oberen Humerusendes bei Geburtslähmungen. *Berl. klin. Wochenschr.*, 1914, li, 1162.
- Rhode, O. Zur Behand. der Entbindungslähmungen. *Zentralbl. f. Kinderheilk.*, 1909, xiv, 119.
- Sharpe, W. The Operative Treatment of Brach. Plexus Paralysis. *Jour. Am. Med. Ass.*, 1916, March 18, lxvi.
- Sherren, J. Brach. Birth Paralysis. *Clin. Journ. London*, 1908-9, xxxiii, 14.
- Taylor, A.S. A Case of Brachial Birth Paralysis. *JOURN. NERV. AND MENT. DIS.*, 1904, xxxi, 666.
- Results of the Surg. Treat. of Brach. Birth Paralysis. *Jour. Am. Med. Ass.*, 1907, xlviii, 90.
- A Case of Brach. Birth Palsy Six Years after Operation. *JOUR. NERV. AND MENT. DISEASE*, 1911, xxxviii, 314.
- Thomas, J. J. Two Cases of Bilateral Birth Paralysis of the Lower Arm Type. *Bost. Med. and Surg. Jour.*, 1905, cliii, 431.
- Obstet. Paralysis with Esp. Reference to Treatment. *Bost. Med. and Surg. Jour.*, 1914, clxx, 513.
- Thomas, T. Turner. Laceration of the Axillary Portion of the Capsule of the Shoulder Joint as a Factor in the Etiology of the Traumatic Combined Paralysis of the Upper Extremity. *Annals of Surgery*, 1910, liii, 77.
- Obstet. Paralysis. *Med. Record*, 1914, lxxxvi, 275.
- A Common Mechanism for Most Injuries of the Shoulder Region. *Jour. Am. Med. Ass.*, 1914, lxiii, 1018.
- Obstet. Paralysis. *New York Med. Jour.*, 1914, c, 63.
- The Relation of Posterior Subluxation of the Shoulder Joint to Obstet. Palsy of the Upper Extremity. *Trans. Phil. Acad. Surgery*, 1914, xvi, 200.
- The Relation of Post. Sublux. of the Should. Joint to Obstet. Palsy of the Upper Extremity. *Annals Surg.*, 1914, lix, 197.
- van Neck. Lésions congénitales de l'épaule et du plex. brach. *Journ. med. de Brux.*, 1912, xvii, 117.
- Warrington and Jones. Some Observ. on Paral. of the Brach. Plexus. *Lancet*, 1906, ii, 1644.
- Whitman, R. Remarks on the Surg. Treat. of Obstet. Paral. *JOURN. NERV. AND MENT. DISEASE*, 1904, xxxi, 497.
- The Treat. of Congen. and Acquired Luxation of the Shoulder in Childhood. *Ann. Surg.*, 1905, xlii, 110.

ON CONVULSIVE SPASM OF THE FACE PRODUCED BY CEREBELLOPONTINE TUMORS¹

BY HARVEY CUSHING, M.D.

SURGEON-IN-CHIEF, THE PETER BENT BRIGHAM HOSPITAL, BOSTON

During the past year two examples of facial spasm of unusual persistence and severity have been seen among the brain tumor cases in the writer's clinic. One of them had previously been diagnosed as focal epilepsy ascribed to a lesion of the contralateral cortex. Both of them proved to be due to a peripheral irritation of the facial nerve by the pressure of a homolateral tumor of the cerebellopontine recess. In a series of some fifty examples of lateral recess tumors, most of them being fibro-endotheliomas (the so-called acoustic neuromas), this particular irritative symptom in corresponding degree has not heretofore been observed.

Of all intracranial growths those of the cerebellopontine angle are possibly the easiest to localize. Their symptomatology is so definite and unmistakable that not only the situation of the tumor but its nature as well may be foretold in the greater number of cases with reasonable certainty.

Diagnostic errors, however, may occur. In one case in the series a papilloma of the choroid plexus had produced the typical clinical picture of a cerebellopontine endothelioma, and in a few instances, as in the case to be recorded, the tumor was found to be a glioma. Occasionally, too, the effects of a circumscribed arachnoiditis of the lateral recess, the sequel of an old otitis media, may bear a close resemblance to the familiar syndrome.

On the other hand there may be errors of localization. We have seen the typical syndrome of a tumor of the right recess produced by a large endothelioma involving the left cerebellar hemisphere, its point of meningeal origin being from the wall of the left lateral sinus. Others have doubtless had similar experiences, but as a matter of fact, these mistakes, though disconcerting, are of minor surgical significance, for they do not seriously affect the outcome provided a bilateral exposure of the cerebellar hemispheres is always made.

¹ Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

More serious, however, would be the error of ascribing to a cerebral lesion symptoms which are really due to a subtentorial growth, and as such a mistake might easily have been made in the two cases under consideration, they deserve this brief record.

Tumors of the cerebellopontine angle, of which the acusticus tumors constitute far the largest number, behave with considerable uniformity as regards the cranial nerves of the region.² The eighth appears to be particularly vulnerable, and as unilateral deafness is one of the earliest and most persistent of the so-called extracerebellar symptoms it is perhaps natural that the majority of the tumors should have been thought to arise from the acusticus or its sheath. The seventh and the fifth nerves are capable of an astonishing degree of elongation as they become stretched over the surface of the enlarging growth. They may become drawn out to many times their normal length and yet not have their function seriously impaired. However, in this process of elongation there may be periods of trigeminal hypesthesia and of facial weakness which vary in their degree and persistence. The lowered trigeminal sensitivity may only be detected by an inactive corneal reflex or there may be a marked loss of sensation over the entire skin field. The facial weakness likewise may be apparent only as a slight loss of emotional symmetry or there may be a marked weakness approaching paralysis. The sixth nerve also is commonly affected, though from a cause other than direct pressure of the tumor, and transient periods of diplopia or even an actual paralysis of the abducens in the affected side may occur.

Varying grades of palsy, therefore, are the usual symptomatic evidences of involvement of these nerves, whereas irritative symptoms are less commonly recognized.³ It is true that tinnitus may precede the deafness, that paresthesias or actual pain may accompany or precede the loss of sensation in the trigeminal area, and trismus-like phenomena have been described from involvement of the motor fibers. Irritative symptoms, however, on the part of the facial nerve do not seem to have occasioned more than the briefest comment. In their well-known study of the cases in the National Hospital, Stewart and Holmes⁴ say that evidence of direct irritation of the facial rarely occurs though twitching may occasionally be observed. Hence, though irritative symptoms are known to

² The cases in the writer's series have been analyzed by Ernest G. Grey: *Studies on the Localization of Cerebellar Tumors*.—V. The Cranial Nerves.

³ Cf. Bruns: *Die Geschwülste des Nervensystems*, Berlin, 1908, p. 180 et seq.

⁴ Stewart, I. G., and Holmes, G., *Symptomatology of Cerebellar Tumors. A Study of Forty Cases*. *Brain*, 1904, XXVII, 522.

occur they appear to be insignificant rather than the predominant feature of the clinical picture.

Since the two cases which we have observed were very similar in all respects except that one proved to be a glioma instead of the more common acusticus fibro-neuroma, the history of the former case alone will be given in full.

SURG. NO. 4139. *January 17, 1916.*—Admission of John J. C., an Italian, aged 30, a clerk, referred by Dr. Moore, of Palmer, Mass., from the Springfield Hospital, with the major complaint of spasmodic twitching of the left face.

His past history is without significance except for the fact that he has twice (ten and eight years ago) received severe blows on the back of the head.

Present Illness.—For nine years he has been troubled by *twitching of the left side of the face*, beginning as a blepharospasm of mild degree coming on a few times a day and lasting for a few seconds. There has been a gradual increase in the number, intensity, and surface extent of these spasmodic movements, until during the past six months they have been very severe, coming on every ten minutes or so and persisting for a full minute or two. They begin with a twitching and drawing of the muscles about the eye and gradually the whole left side of the face is pulled over in a grimace and the surface muscles of the neck are affected. He states definitely that there have been a few severe attacks in which the left arm and leg have mildly participated in the attack and that the left arm and hand have felt numb on several occasions.

For three years he has had occasional momentary shooting pains in the frontal region produced by sudden movements and for the past two months there has been some suboccipital discomfort on arising in the morning, but he does not regard these as *headaches*. His *vision* has been poor for many years and he has had repeated changes of glasses. For the past year there has been a definite blurring of objects, a good deal of photophobia, and occasional diplopia, but he retains reading vision. His *hearing* on the left has been poor for many months and is ascribed to former attacks of "ear-ache."

He has suffered for a year from some "indigestion" and from constipation, and for the past two weeks has had occasional morning *vomiting* which he says has been blood-tinged at times. For some weeks, too, he has appreciated some difficulty in swallowing, which required an extra effort, and also talking was somewhat difficult and he has had repeated attacks of hiccoughs. He has had a good deal of nasal catarrh and several nosebleeds of late.

For a year he has noticed an *unsteadiness of gait* with occasional staggering. This has increased to such an extent that for six months he has been unable to walk. He attributes this entirely to *dizziness*.

On several occasions during the first six months he has had *olfactory hallucinations* as of something burning (rags). There is

some confusion at the time and the sensation may last for five or ten minutes. No gustatory sensation occurs.

He has seen many doctors, most of whom regarded his trouble as of gastro-intestinal origin. He has lost over twenty-five pounds in weight.

*Physical Examination.*⁵—A poorly nourished, bed-ridden young man, complaining of frequent attacks of frontal pain. Every five or ten minutes the left side of his face is involved in a spasm which begins with twitching of the orbicular muscles, spreads over the face

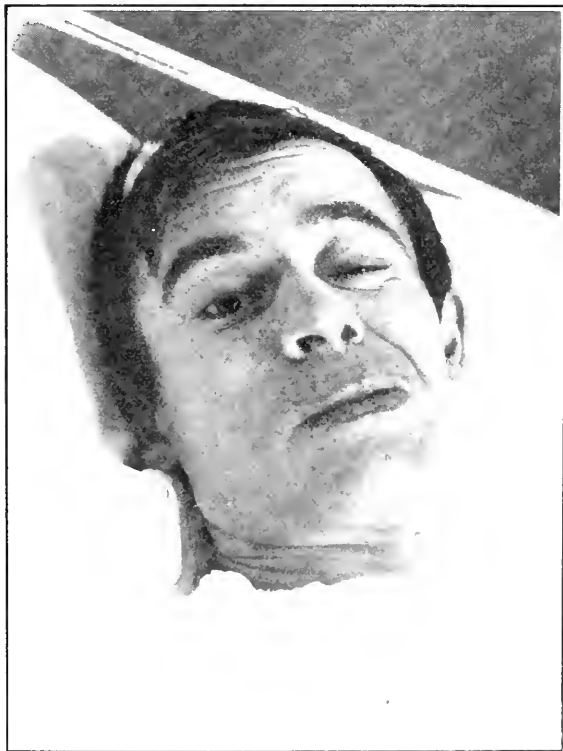


FIG. 1. Patient during the tonic stage of one of his attacks.

and involves the platysma (Fig. 1). The attacks seem to be precipitated by talking, laughing, or by excitement. He has no control over the spasms and they occasion no pain.

Apart from the positive neurological findings the general physical examination was practically negative. The systolic blood pres-

⁵ The following members of the surgical staff participated in the studies, the essentials of which are here abstracted. General history and physical examination, Merritt Jones; special neurological history and examination, Gilbert Horrax; ophthalmological notes, Clifford Walker; X-ray studies, Gladys Carr; special cerebellar tests, Ernest G. Grey. As is customary, most observations were repeated on more than one occasion.

sure was low (100 mm.). The temperature and pulse ranged sub-normal. Blood negative.

Neurological Examination. Head.—No apparent scars. Definite tenderness on pressure over right parietal region. X-ray shows some enlargement of venous channels and some rarefaction in the region of the coronal suture. Slight pressure atrophy of the dorsum sellæ.

Cranial Nerves.—I. Normal. II. A bilateral choked disc,—O.D. elevation 2 to 3 D; O.S. elevation 1 D, receding with atrophy. III, IV and VI. Pupils normal: ocular movements show nystagmoid twitches slower to left than right. V. No subjective numbness or paresthesia. Motion, normal: sensation apparently unimpaired though patient states that delicate tactual impulses are less distinct on the left than right. VII. No apparent weakness. Face symmetrical except when in attack. VIII. There has been some mild tinnitus for six months. There is loss of air conduction on the left but bone conduction appears to be equal on the two sides. Weber's test equal right and left. IX, X, XI and XII. Practically negative. His enunciation is poor, there being some slurring (dysarthria). Also some deglutitory difficulty is complained of. Attacks of vomiting and hiccuping.

Cerebrum.—(Patient is right-handed.) No symptoms definitely referable to the brain with the possible exception of the spasmodic attacks and the suggestive uncinate seizures (olfactory). A slight weakness is apparent in the left arm and leg: dynamometer left 10, right 22. Also there is a slight relative hypesthesia over the left side of the body.

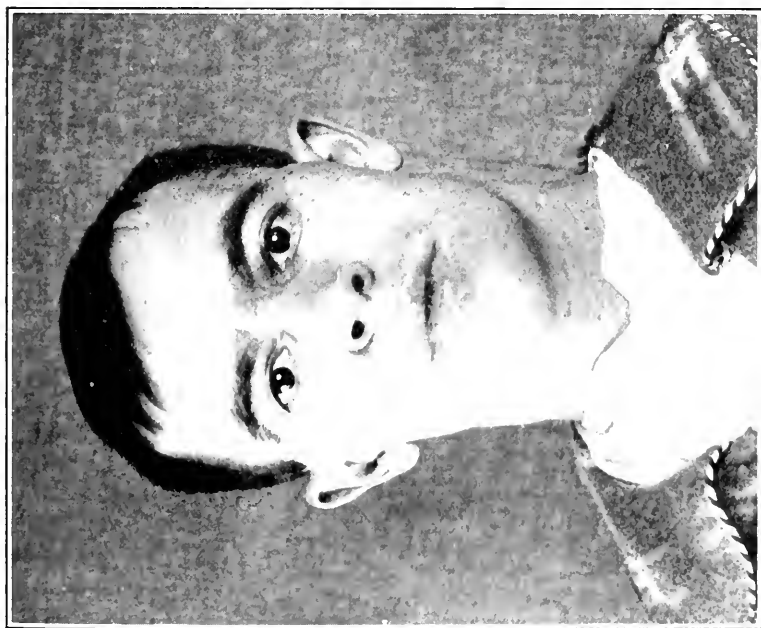
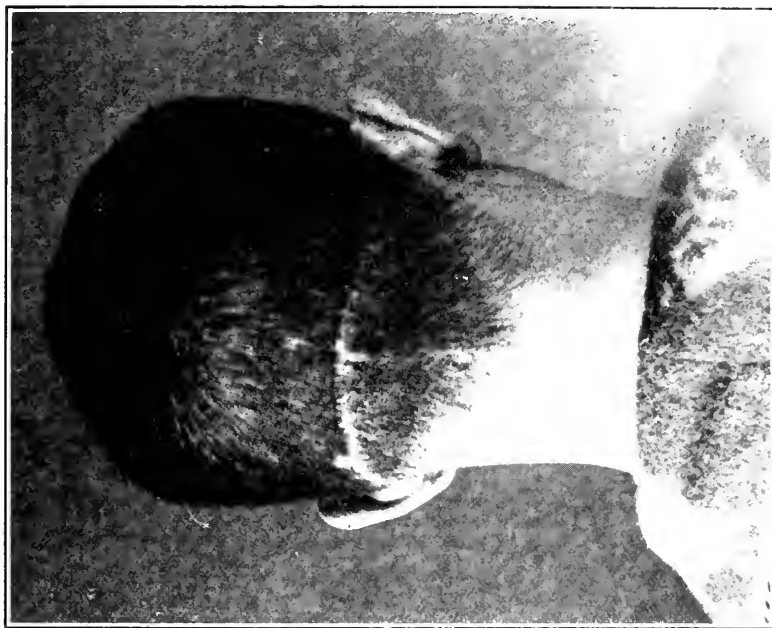
Cerebellum.—Patient bedridden, so gait and station not tested. Tests of coördination show weakness and slight ataxia. (Nystagmus already mentioned.) Possible extracerebellar involvement of the acusticus and the facial.

Reflexes.—Superficial: corneal, abdominal, epigastric and cremasteric inactive on left; normal right. Deep: brisk to exaggeration throughout. A left ankle clonus was present and a positive Babinski and Oppenheim were present on the same side, the right plantar reflex being normal.

The impression of the examiner at this point favored a slowly growing left cerebral lesion encroaching on the facial center. The positive findings as assembled were as follows:

Subjective.—Twitching of the left face (9–10 years). Intracranial pains (18 months). Gastric disturbances and failing vision (1 year). Some dysphagia and dysarthria (5–6 months). Dizziness.

Objective.—Left facial spasms. Bilateral choked disc, more advanced on right. Right parietal tenderness. Weakness and slight hypesthesia of left side of body. Diminished superficial and exaggerated deep reflexes on the left with ankle clonus and positive Babinski. Slight ataxia of extremities. Slight dysarthria and dysphagia. Nystagmus.



FIGS. 2 AND 3. After operation.

Subsequent and repeated studies brought out the following additional points and certified the diagnosis of a subtentorial lesion.

Special Cerebellar Studies.—Head held somewhat tilted to right shoulder. Flexing and twisting of head causes increase in general discomfort. Definite nystagmus, both lateral and vertical. Corneal reflex relatively inactive left. Slight hypesthesia left face. Jaw deviates slightly to left and left masseter weaker than right. Taste discrimination poor on left. Emotional movements of left lower face less good than right. Loss of hearing on left (apparent bone conduction probably transferred as it is lost with caloric test). Definite ataxia of left arm and leg with dysmetria (gives a history of clumsiness of left hand and general enfeeblement of left side before confinement to bed). Caloric tests: no response left, normal right. Diadococinesia: poor right; less good, left.

Clinical Impression—Subtentorial tumor involving cerebellopontine angle, probably an acoustic tumor, in view of long duration of symptoms. Uncinate (?) attacks possibly attributable to hydrocephalus. The left weakness and hypesthesia with increased deep and altered superficial reflexes due to pressure on the pyramidal tract and fillet. The facial spasm an unusual feature.

January 24, 1916. Operation. *Bilateral suboccipital exploration with partial removal of a supposed acoustic neuroma from the left recess.*

The usual cross-bow incision. The occipital bone had undergone no pressure absorption, accounting for the absence of tenderness. The exposed dura was so tense as to necessitate puncture of the left lateral ventricle. This lowered the great tension and permitted wide opening of the dura without undue protrusion of the hemispheres. On exploring in the left recess the margin of a large fluid arachnoid cyst, such as frequently caps a recess tumor, was brought into view. On evacuating the cyst the surface of the tumor was exposed; its surface vascularity was greater than with the usual endothelioma. Its capsule was incised and as much of the contents as possible was scooped out. In the process a cystic area within the tumor was opened with the additional escape of fluid and the tension was completely relieved. The large cavity was filled with salt solution and the external wound was securely closed in layers as usual without drainage.

The patient made a good operative recovery; the wound healed without reaction. (Figs. 2 and 3.) The facial spasms gradually subsided together with all other symptoms except his nystagmus, which persisted. There was even a considerable restoration of hearing on the left. The choked disc cleared without further lowering of vision.

At the end of a month he was able to walk alone without support and at the time of his discharge, on March 3, he had gained twenty-five pounds in weight.

The *histological examination* of the tumor tissue showed it to be a fibrogloma of unusual type. (Fig. 4.) There were an unusual

number of fibrils and the cells were of varying sizes, some multi-nucleated. The tumor was undergoing degeneration in many areas and there was very marked hyaline change in the vessel walls.

In the light of the ultimate findings in this patient's case it is difficult to believe that confusion could have existed in the mind of any careful examiner as to the situation of the lesion. However, the outstanding feature of the clinical picture lay in the convulsive seizures of the left face and the history of the attacks spreading to

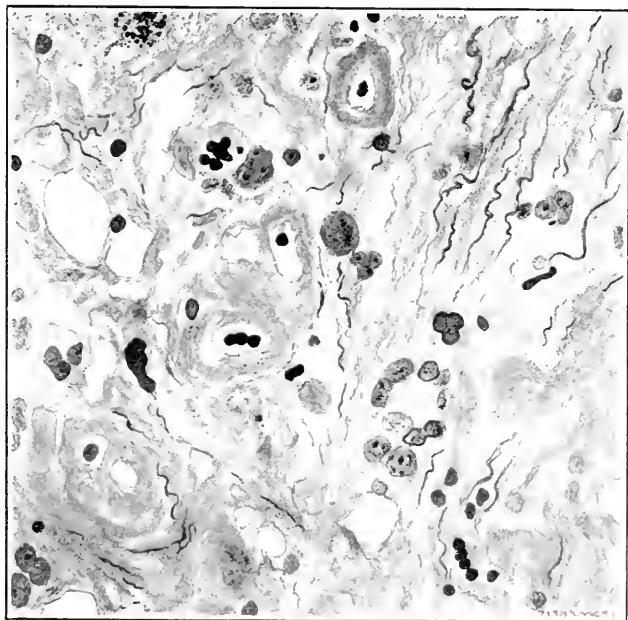


FIG. 4. Histological sketch of tumor (mag. $\times 300$), showing glia-fibrils, marked hyaline change of blood-vessel walls, and various sized glia-cells.

the arm and leg. This coupled with the sensory disturbance and the evident pyramidal tract involvement of the same side, together with the contralateral cranial tenderness and the more advanced choked disc of the right eye, might easily have been misleading to a casual observer, laboring under the handicap of a bedridden patient.

Even had there been no definite symptoms referable to the cerebellum itself, such as the nystagmus, the loss of hearing on the same side with a normal appearing tympanum should have immediately aroused a suspicion of the true seat of the lesion. Then, too, all of the convulsive spasms which were observed were limited to the facial territory and it is probable that the recorded attacks

in which arm and leg were involved were erroneous observations on the patient's part and were merely a manifestation of the general hypesthesia of the left side of the body. Certainly true Jacksonian attacks due to a cortical tumor large enough to produce marked general pressure phenomena could hardly have existed for nine years without the irritative phenomena having been superseded by more marked paralytic symptoms than were seen in this patient. With such a tumor, moreover, one would have expected some participation in the attacks by adjoining centers with involvement of masticatory or lingual movements or the production of some degree of aphasia.

On the other hand, one might argue that pressure against the intracranial portion of the facial nerve for this length of time would have been still more likely to have caused paralysis, despite the fact already mentioned that the facial is capable of great elongation and displacement by recess tumors without appreciable impairment of function.

Facial spasm (the so-called "idiopathic" facial spasm, *tic convulsif*) is the most common of all forms of local spasm and is usually attributed to some reflex irritation arising in the trigeminal distribution. There are doubtless many causal agencies. In minor degree it is common in association with severe facial neuralgias and accompanies, or in some cases inaugurates, the paroxysm. I have seen, however, two examples of typical painless *tic convulsif* develop in patients after the resection of the trigeminal root for severe neuralgia which had previously been unaccompanied by any evidence of facial spasm. They were both cases of complete relief from the neuralgia with totality of the resection certified by a complete and permanent post-operative anesthesia of the trigeminal skin field. Furthermore, examples of severe facial spasm accompanied by unbearable pain referred to the trigeminal area which is absolutely unrelieved by trigeminal root resection or removal of the Gasserian ganglion are well known. An important observation in regard to cases of this kind has been made by Weisenburg,⁶ who found a cerebellopontine tumor at autopsy in a patient who had suffered for years from facial spasm accompanied by severe pain which had been unaffected by a trigeminal resection.

In view, therefore, of their possible occurrence after a resection of the trigeminus or of their continuance if they antedated the resection, it is evident that all cases of typical facial spasm of the *tic convulsif* type cannot be attributed to a sensory reflex, at least from

⁶ Weisenburg, T., Cerebellopontine Tumor Diagnosed for Six Years as Tic Douloureux. Journ. Am. Med. Assn., 1910, LIV, 1600.

a peripheral field. It would seem more likely that the spasms arise in certain individuals from some lack of motor and sensory balance in the facial musculature rather than from a reflex irritation.

Views as to the etiology of this form of facial spasm are more or less speculative and as it is often regarded as a psychogenic manifestation it is important to bear in mind that, in some cases at least, the condition has a definite organic basis and that the pressure of a tumor on the nerve in its intracranial course may inaugurate convulsive spasm which may persist for years without any ensuing paralysis.

As is typical of all of the so-called idiopathic facial spasms, the motor paroxysms in the case of the patient under consideration were inaugurated by facial movements in the facial territory consequent upon talking, swallowing, laughing, chewing, and so on. The recurring spasms, moreover, were absolutely painless and subsided after the operation and partial removal of the tumor, a procedure which must have served to relieve the pressure against the nerves, for even the severely implicated acusticus regained some of its function. It must be admitted, in view of the histological nature of the tumor (glioma), that the facial spasms may have antedated the growth, though all things considered, this seems improbable.

Summary.—This paper deals with a case of typical convulsive spasm of the left face which after many years' duration became associated with evidences of intracranial pressure. The combination of symptoms might easily have been mistaken for cortical epilepsy due to a cerebral growth, whereas they were apparently produced by the pressure against the facial nerve of a subtentorial tumor in the lateral recess.

FACIAL DIPLEGIA IN MULTIPLE NEURITIS¹

BY HUGH T. PATRICK, M.D.

CLINICAL PROFESSOR OF NERVOUS AND MENTAL DISEASES, NORTHWESTERN UNIVERSITY MEDICAL SCHOOL, CHICAGO

In 1908 Laurans (1) collected nineteen cases of facial diplegia in multiple neuritis. A couple of these are rather apocryphal. To his list I have added twenty-nine, including my own, but perhaps two or three of these may be considered doubtful besides half a dozen that I have taken at second hand, the original reports not being accessible. Probably the earliest cases are those of Pierreson (2) (1867), and Buzzard (21) (1874 and 1879), and possibly that of Barwinkel (3), though none of them was recognized at the time for what it was. Years later Buzzard himself properly classified his (22). Several writers mention having seen cases without describing them (Remak (23), Wertheim-Solomonson (24), Grasset and Rauzier (25), Bury (26), Gowers (27), Oppenheim (43)). So the complex though unusual is not exceedingly rare. The reported cases show in the main considerable similarity but a great many minor variations.

Perhaps the most frequent type is a not very severe multiple neuritis beginning in the legs, affecting the arms less, with total facial diplegia. The combination of complete double facial palsy with less intense involvement of the extremities is the striking feature. In only rare instances is the facial palsy partial (Jolly (28), Lunz (52)). But the degree of quadriplegia is exceedingly variable. In some (Crouzon (29), Eisenlohr (30), Pierson (31), Jolly (28)) the four extremities are completely paralyzed for months, in a few there has even been incontinence of urine and feces (Bonnet (9), Crouzon (29)) and one fatal case (Bonnet (9)) is on record.² On the other hand, legs and arms may be only slightly weak. In Langdon's (32) case the extremities were scarcely paretic and even the knee jerks could have been absent but a few days for they reappeared seven days after the onset of the facial palsy, long before there was any facial movement whatsoever. In Bregman's (12) case one might even question the presence of neuritis. One arm was slightly weaker than the other, there was paresthesia in the legs

¹ Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

² Strümpell (33) reports one death but it was from pneumonia.

and they tired easily, but the deep reflexes were exaggerated. As we would expect, sometimes the legs are badly affected and the arms escape, but the arms may be weaker than the legs (Cestan and Barboneix (17)). Following the rule, the distal muscles are weakest and slowest to recover, but occasionally the pelvic girdle or shoulder girdle suffers most (Bonnet (7)). In at least seven cases (Havage (6), Bonnet (9), Préorbrajenski (10), Sinigar (15), Crouzon, (29), Eisenlohr (30), Barwinkel (3)) other cranial nerves were involved, but as a rule for a short time only. Optic neuritis has been observed once (Jolly (28)), involvement of the auditory never.³

Assuming that multiple neuritis is always caused by a poison (or infection), and knowing that certain tissues are peculiarly vulnerable to certain poisons⁴ (wrist-drop from lead, foot-drop from arsenic, paralysis of palate and ciliary muscle from diphtheria), one naturally asks whether the facial palsy may not be due to a particular toxic agent. This cannot confidently be answered in the affirmative. But the negative aspect is interesting. Apparently the most frequent causes of multiple neuritis do not cause facial diplegia. No case has been due to a metallic poison (except probably one of plumbism casually mentioned by Bury (26)), and I believe no case due to alcohol, although one patient was a wine dealer⁵ (Havage (6)), one was known to be alcoholic (Bonnet (8)) and Jolly (28) thought his case in a beer-drinking restaurant keeper was alcoholic. I have found no typical case due to diphtheria, though of 171 cases of diphtheritic paralysis collected by Ross (26) five showed more or less facial diplegia and of fifty cases of precocious palatal paralysis in diphtheria collected by Rolleston (45) two had labial palsy. There is no case following typhoid unless my first case be one. The most frequently surmised cause has been influenza but in no case was this definitely ascertained and in only four out of thirty-four cases (Cestan and Barboneix (17), Westphal (20), Sinigar (16), Langdon (32)) was it thought highly probable. One case (Strümpell (4)) followed, not immediately, a non-suppurative lymphangitis of the hand and arm, four (Pierreson (2), Mirallic and Plantard (19), Bonnet (7), Bernard and Braun (13)) a longer or shorter period after a throat or tonsillar infection, but in no instance was a culture made. One case (Raymond (18)) occurred in the course of gonorrhea and one following confinement, though there is said to have been no puerperal infection (Lunz (52)). At least one may have

³ Strümpell (33) reports a case of alcoholic multiple neuritis with nerve deafness. Face not involved.

⁴ Perhaps it is equally reasonable to say that certain poisons have a special predilection for certain tissues or the tissues an affinity for certain poisons.

⁵ *Marchand de vin*, probably what we would call a saloon keeper.

been due to ptomaine poisoning (Raymond (14)) and one (Singer (34)) occurred in what was supposed to be malarial polyneuritis. But in most cases the signs of infection were vague and not severe and in a good many there was no prodromal illness at all. In a very few the constitutional signs were severe.



FIG. 1. Showing appearance of face when at rest. Note the dropped lower lip.

CASE I.⁶—A married woman of 21 was first seen December 27, 1915. The past history was unimportant. A month before she had begun to have fever which lasted for three weeks. The temperature fluctuated much as in typhoid but, aside from a few doubtful rose spots on the abdomen, other symptoms of typhoid were lacking. Widal negative. No focal infection could be found. This fever occurred during a rather prevalent epidemic of what was currently called "grippe," but the organism found was generally a streptococcus or the *Micrococcus catarrhalis*. The patient declined to go to a hospital and no bacteriologic examinations were made. The course of the fever was benign, maximum temperature about 102° F., not much prostration. Five days before I saw her, having been out of bed only a few days and still feeling rather weak and shaky on her legs, the patient started to go down two flights of stairs to the street. The legs felt weaker than they had a couple of days

⁶ For the opportunity of seeing this case I am indebted to Dr. Sylvan Kunz.

before and she fell the last step or two of the first flight down. She picked herself up but had great difficulty in mounting the one flight to her apartment where she was put to bed. The next day she complained of headache (bitemporal), not very severe, which soon extended to the subocciput and neck. This continued for a few days although there was no fever. The patient had slept poorly, but it was not the pain that kept her awake. With the appearance of the pain she noticed that she could not talk well because the lips didn't move and about the same time felt mild tingling of the fingers and toes and a very little of the lips. Dr. Kunz had seen her the day before my visit and noted a bilateral facial palsy, no other paralysis, good knee jerks, normal temperature and rather rapid pulse.



FIG. 2. Appearance of patient when she tried to close the eyes tightly and spread the mouth as in showing the teeth. Note inability to close the eyes and entire absence of contraction of lower facial muscles.

I found complete bilateral facial palsy, except that in trying hard to show the teeth there was a just perceptible movement of part of the right upper lip. When the patient tried to close the eyes the right lid dropped a little more than the left but on neither side was there a trace of muscular contraction. The lower lip dropped, leaving the mouth partly open. Of course the face was absolutely devoid of expression, labials could not be enunciated and other sounds dependent in part on lips and cheeks were imperfect. The soft palate seemed to rise not very well but gutturals were well uttered and there had been no regurgitation of fluids through the

nose. The other cranial nerves were entirely normal, optic discs and taste not examined. The patient could walk alone but not well, the gait being paretic-ataxic. Strength of the legs tested in bed was good at all joints but at ankle not quite so good as at knee and hip; no noticeable difference between flexion and extension. The heel-to-knee test showed distinct though not marked ataxia. The knee jerks were equal and good. The Achilles jerk on the left was absent. On the right occasionally a very slight response could be obtained. There seemed to be faint tactile anesthesia of the feet and the leg muscles were rather too tender to firm pressure. Direct myotatic irritability (tapping belly of muscle) normal. The upper extremities were not involved though the grasp was not very vigorous and there may have been a trace of ataxia. Deep reflexes of the arms, plantar and abdominal reflexes were normal; jaw jerk not examined. Sphincters were normal and there were neither trophic nor vasomotor changes. The pain had disappeared, temperature normal, pulse rapid, after exertion considerably more so with slight irregularity. Chest, abdomen and pelvis normal. Diagnosis, multiple neuritis involving especially both seventh nerves.

A week later (January 2) the face was the same. The masseters, temporals and pterygoids were normally strong but the jaw jerk was absent. The palate seemed to be slightly weaker but hard *g* was well sounded and there was no regurgitation. The legs were distinctly weaker, the left slightly worse than right. With patient supine, knee extended, the foot could scarcely be raised ten or twelve inches above the bed. The feet could be fully flexed dorsally but not very forcibly. Against the patient's best endeavor I could push the foot down with my index finger. The calf muscles also were weaker than before. Achilles jerks absent, knee jerks diminished. Ataxia of legs increased but not bad. Tactile anesthesia of feet slightly more distinct, otherwise sensation normal. Calves more tender to pressure and their direct myotatic irritability increased; not so in anterior tibials. Strength of arms and hands diminished and deep reflexes of arms slightly diminished (triceps jerk most); the arms and hands slightly but clearly ataxic.

January 11.—Condition much the same except that the lower extremities were somewhat weaker, especially at the hip, the pelvo-femoral group apparently quite as weak as the leg muscles. Patient could not stand. The knee jerks and abdominal reflexes had disappeared, Achilles jerks and jaw jerk still absent. There was slight exophthalmos on the left and some escape of tears on this side. Taste was normal. Direct myotatic irritability of calves, anterior tibials and of extensor muscles of forearm increased. All muscles of the extremities contracted well to faradism. Those of the right face responded well to a strong current, those of the left face less well. The pulse was 90 and thin. After the patient had been sitting for ten minutes it rose to about 120, somewhat irregular and intermittent. The urine showed a trace of albumin, crystals of oxalates and uric acid, no casts.

January 18.—Until the last few days patient had slept poorly,

now sleeping well. Face unchanged but faradic reaction practically nil. Knee jerks could just be elicited with reënforcement and the right abdominal was faintly present. Otherwise condition unchanged. The photographs were taken on this date.

February 15.—About two weeks ago patient noticed that she



FIG. 3. Showing very fair voluntary dorsal flexion of feet.

could move the lips a little and close the eyes better and that the legs were less weak. Since then improvement has been rapid. Movement of the right side of the face is nearly normal. All muscles on the left contract but less strongly. Can barely close the left eye and in laughing, puckering the lips and showing the teeth, the left side contracts much less than the right. The soft palate still seems to move poorly. The patient can just walk alone, the gait paretic and tottering, short steps. Tested when recumbent the strength of all the muscles of lower extremities is much greater than a month ago. There is very slight ataxia of legs and I think a little of arms, although the patient thinks she plays on the piano about as well as ever. She can stand on toes, and on heels for a moment. The deep reflexes are still absent, including the jaw jerk. Direct myotatic irritability is not increased and the muscle tenderness is gone. Arm and leg muscles contract well to faradism. The patient would not allow a satisfactory electric examination of face but muscles on left side do not contract to fairly strong current. The pulse is 72 and soon after walking only 84.

May 1.—The patient considers herself well but there are still faint traces of the facial palsy, very slight ataxia of the hands and a

little difficulty in rising onto the toes of one foot. The deep reflexes are absent except that in Babinski position with reënforcement the Achilles jerks are just perceptible and the right wrist jerk is faintly present. Patient given $\frac{1}{30}$ grain strychnia t.i.d.

May 17.—Deep reflexes present, extremities normal but cannot close eyes very tightly.

For report of the next case I am indebted to Dr. Peter Bassoe, in whose practice it occurred.

CASE II.—A woman of twenty-eight years, married nine years, two children, admitted to St. Elizabeth's Hospital May 15, 1908. Family and personal histories unimportant, except that one sister and patient had migraine. No alcohol, but headache powders at menstrual period.

Two and a half months before admission abortion had been induced. After the abortion she had considerable discharge and some chills, but was not confined to bed. From that time she began to lose flesh. Eight days before admittance she was taken with pains all over and the big toes felt stiff. She went to bed and was menstruating the next seven days. The generalized pains lasted for six days and were aggravated by any movement. There was practically no pain when she lay perfectly still. Facial asymmetry had been noted two days before admittance.

Examination.—Mentally normal; pupils and ocular muscles normal. Distinct, right-sided facial palsy involving the orbicularis palpebrarum and the occipito-frontalis. Motor and sensory fifth nerve not affected. Ophthalmoscopic examination negative. Sight and hearing normal; taste apparently slightly impaired on the right half of the tongue. Motion of palate normal; speech normal. General motor weakness of extremities but no localized paralysis, except in face. Sensation everywhere normal. Wrist, elbow, knee and ankle jerks absent. Abdominal and plantar reflexes present. Urine normal.

Two weeks later, on May 30, the following note was made: After a couple of days the left side of the face became slightly involved so neither eye could be completely closed. Then both sides gradually improved, so the face now is nearly symmetrical and normal in appearance when at rest, but on smiling or showing the teeth the right side still is distinctly weak and this is more marked in the upper branch. There is considerable tenderness of the facial muscles and the patient complains of paresthesias and bad taste in the mouth. During the last ten or twelve days there has been some tenderness of the leg muscles.

June 30.—Better; muscular tenderness less marked; sits up part of the time.

July 2.—Can walk a little.

July 15.—Walks quite well.

October 28.—She had been well until a month ago, when she lost her maid and had to do more work than usual. She complained of slight abdominal pain, soreness about the neck and eyes and poor

appetite. Still slight trace of right-sided facial paralysis. Ankle jerks present, stronger on left side; knee jerks only on reënfacement; wrist and elbow jerks not obtained.

January 4, 1909.—Husband says she is perfectly well and now two months pregnant. In December, 1915, she had remained well except for the usual headaches, and had given birth to two more healthy children.

The relation of facial diplegia as part of generalized neuritis to ordinary peripheral facial diplegia without multiple neuritis, that is, to so-called rheumatic double facial paralysis, and even to ordinary Bell's palsy presents some interesting aspects. I confess I had thought the distinction of the first from the latter two much clearer than it appears to be. For instance, it seemed reasonable to suppose that in the facial diplegia of multiple neuritis the chorda tympani would always escape, as it did in my case. The chorda tympani has no physiological or anatomical connection with the facial nerve except as a casual companion for a short distance. No histologic examination of the entire facial nerve from a case of facial diplegia in multiple neuritis is on record, but, as Bonnet remarks of his own autopsy case in which the facials were not examined, it is reasonable to assume that the lesion is that of the other nerves, a toxic degeneration or what has been miscalled parenchymatous neuritis. The facial is involved because of its susceptibility to the causative poison. When the other nerves of special sense and the fifth escape we might expect this special sensory nerve also to be refractory. But such is not always the case. In the majority of reported cases taste was not examined. In some it was normal, but in several it was diminished or lost on the anterior part of the tongue (Langdon (32), Bregman (12), Althaus (5), Barwinkel (3), Pröobrajenski (10), Bernard and Braun (13)), as it is in many cases of facial diplegia and monoplegia *ex frigore*. Then, one is struck by the gradual gradation of cases from those in which the multiple neuritis is severe to those in which it is scarcely perceptible or questionable. At once the question arises as to the difference between these last and cases of facial diplegia like those of Rhein (36), Barkas (51), Raymond (35) and many others which are of unknown or so-called rheumatic origin and have no signs of multiple neuritis. The double facial palsy is the same. Only in the one set there is a little weakness of the extremities and change in the deep reflexes. Then comes a case like that of Bregman (12): facial diplegia, deep reflexes normal or exaggerated but ready fatigue and some paresthesia of the legs. In short, clinically there seems to be no dividing line between the facial diplegia of polyneuritis and facial diplegia *ex frigore*. To go one

step further one might ask what is the essential difference between rheumatic facial diplegia and ordinary unilateral facial palsy *ex frigore*. I believe the difference has generally been thought to be merely casual; the neuritic process the same in both. Only in the former for some reason both sides happen to be affected instead of one. The evidence of the microscope in the unilateral cases is most interesting. The examinations of Minkowski (37), Darkschewitsch and Tichonow (38), Dejerine and Theohare (39), Mirallié (40), Alexander (41) and André Thomas (42) all showed a degenerative, not an inflammatory, process; in other words, just the lesions found in the peripheral nerves in cases of multiple neuritis. Strümpell's (32) examination of the facial nerve in the diplegia of multiple neuritis, limited to the extrapetrous part of the trunk, showed the same lesions and presumably the fallopian part would have shown them also. In the other cases just cited except that of Mirallié the intrapetrous portion of the nerve was carefully examined and in no case was there evidence of inflammation or pressure. Nor was inflammation of the geniculate ganglion found, unless to a slight degree in the case of Alexander. In short, the pathological anatomy so far as known seems to indicate that ordinary rheumatic facial palsy is of infectious or toxic origin, degenerative and not inflammatory.

Some clinical features support this histological testimony. Facial palsy has been reported in the course of or following numerous infections (tonsillitis, erysipelas, articular rheumatism, herpes zoster, puerperal fever, mastitis, diphtheria, influenza, etc.), and I have repeatedly seen it come on after extraction of teeth and alveolar infection.⁷ It is notorious that in many cases of rheumatic Bell's palsy there is no history at all of direct exposure of the face, but often there is some feeling of malaise or evidence of the patient having taken cold.

In short, the nature of these so common maladies is exceedingly obscure. In the diplegia facialis of polyneuritis, although it is far from being proven, there would seem to be some special poison peculiarly noxious to the seventh nerve because when this nerve is involved, nearly always both are affected, equally so, and the paralysis is not only total but is relatively intense. Even when extremities are completely paralyzed they improve and recover before the face.⁸

⁷ Presumably its occurrence in mumps, leprosy and tetanus depends on local invasion of the nerve. Facial diplegia in tetanus occurs only when the primary lesion is in the median line of the face. Lévy (50), Crouzon (44), Darkschewitch (60) reports facial diplegia following injection of anti-rabic serum.

⁸ The one exception is the case of Eisenlohr.

This assumption is further supported not only by the relative rarity of facial involvement but by the fact that its occurrence bears no relation to the intensity of the poisoning as evidenced by general symptoms and degree of involvement of other nerves. Also by the relative immunity of the facial nerves to those agents which most frequently cause multiple neuritis. What this special agent or these special agents may be, if there be such, is matter for conjecture. For a long time I have been convinced that there are many as yet unidentified poisons of organic origin capable of causing multiple neuritis. On the other hand, the production of unilateral Bell's palsy by a general toxic agent is against the clinical canons of toxic paralysis, for symmetrical bilaterality is its first law. But perhaps such paralysis is no stranger than the localization of an infection always on one side and always in only one or two sensory ganglia as is the case in herpes zoster.

In this connection the experiments of Rosenow (61) are of especial interest. In his work on the etiology of rheumatism he found that by exposure to cold he could localize the action of the causative infectious agent to a given extremity. This might well lead one to inquire whether the exposure which has been supposed to cause peripheral facial palsy may not be simply the agent or influence which causes a generally circulating poison to localize its action on a given facial nerve. More recently Rosenow has succeeded in cultivating strains of bacteria which have a selective action for peripheral nerves. So if we can assume a toxic agent with a special affinity for nerve tissue we might believe that this poison would affect only a facial nerve which had been exposed to cold. Of course, this hypothesis goes further than the work of Rosenow justifies, for his experiments were done with living bacteria and we do not know that the facial nerve is invaded by organisms. Indeed, the microscopic examinations thus far made would indicate that it is not. Whether or not acute peripheral facial palsy is ever caused by direct extension of infection from mouth or throat, as sometimes seems to be the case, must be left to future investigators.

The only alternative explanation would seem to be the assumption of an individual vulnerability of the facial nerves, making them liable to be paralyzed by any one of several or many toxic agents. That such an individual vulnerability or susceptibility does sometimes exist is strongly indicated by cases of recurrent facial palsy which are not very rare. But it is worthy of note that in no case of facial diplegia in multiple neuritis is it recorded that the patient ever had had a facial palsy. Furthermore, unilateral peripheral

facial palsy has been observed in the course of multiple neuritis, whether or no caused by the same morbid agent is not known.

An excellent example is the following unpublished case for which I am indebted to my colleague, Dr. Peter Bassoe.

A man, 23 years old, single, was seen on September 12, 1914, in consultation with Dr. S. E. Donlon. History unimportant except occasional spreeds. Eight days ago chilled on auto ride and caught cold. In a day or two fingers and toes became numb. September 6 another long auto ride; September 7 headache. September 8 was at work but the calves felt sore and he grew weak; fell down in the evening. At home since then and unable to walk since September 10. Some difficulty in swallowing; no sphincter disturbance.

Examination.—Mentally clear. Pupils, discs and ocular muscles normal. Distinct left facial paralysis of peripheral type. Marked weakness of distal parts of all four extremities. Moderate muscular tenderness, no anesthesia. Wrist, elbow, knee and ankle jerks absent; abdominal reflexes present but weak; plantar normal.

September 15.—Practically no change.

September 29.—The patient now has complete paralysis of all four extremities. On September 20 sudden aggravation of difficulty in swallowing and he could barely talk, but these disturbances rapidly improved when atropine was given. Facial paralysis less marked. By November 10 patient was able to walk and three months later is said to have been perfectly well.

BIBLIOGRAPHY

1. Aimé Laurans. Des Diplégies Faciales au Cours des Polynévrites. Thèse de Paris, 1908. The references 2 to 20 inclusive are the cases collected by Laurans.
2. Pierreson. Arch. gén. de Méd., 1867, Vol. 10, p. 296.
3. Barwinkel. Arch. f. Heilkunde, 1867. Cited by Pierreson.
4. Strümpell. Neurolog. Centralblatt, 1889, p. 601.
5. Althaus. Lancet, March 28, 1891. Deut. med. Wochens., 1891, 1086. Two cases. First one is that of Strümpell.
6. Havage. Rev. de Méd., 1891, p. 139.
7. Bonnet. Contribution à l'Étude des Névrites périphériques infectieuses aiguës. Thèse de Lyon, 1892.
8. Do.
9. Do.
10. Préobrajenski. Mémoires méd. de Moscow, 1894, No. 3. Rev. Neurol., 1894, p. 234.
11. Targowla. Rev. Neurol., 1894, p. 465.
12. Bregman. Neurolog. Centralbl., 1896, Vol. 15, p. 242.
13. Bernard and Braun. Lyon Méd., 1898, December 18. Rev. Neurol., 1899, p. 571.
14. Raymond. Nouvelle Iconographie de la Salp., 1899, p. 1. Clinique des Mal. du Syst. Név., 1898-99, p. 606.
15. Sinigar. British Med. Jour., 1899, July 15, p. 138.
16. Do.
17. Cestan and Barboneix. Gazette des Hôp., 1900, June 28.
18. Raymond. Le Progrès Médical, Vol. 14, 1901, July 27, p. 49. In the thesis of Laurans this reference is incorrectly given.
19. Mirallic and Plantard. Rev. Neurol., 1906, Vol. 14, p. 480. Reported in detail by Laurans.

20. Westphal. Quoted by Laurans from thesis of Diémer. (Paris, 1900.)
Published in St. Petersburg med. Wochens., 1890, No. 21.
21. Buzzard. Transactions of Clinical Society, Vols. VII and XIII.
22. Do. Clinical Lectures on Diseases of the Nervous System, London, 1882,
p. 301. Lancet, 1885, November 28, December 12 and 19.
23. Remak. Nothnagel's Specielle Path. u. Therap., Vol. II, p. 344.
24. Lewandowsky's Handbuch., Vol. II, p. 88.
25. Grasset and Rauzier. Maladies du Système Név., 1894, Vol. II, p. 457.
26. Ross and Burry. On Peripheral Neuritis, London, 1893.
27. Gowers. Diseases of the Nervous System, Vol. I, London, 1899.
28. Jolly. Berlin. klin. Wochens., 1894, No. 12, p. 281.
29. Crouzon, Chatelin and Athanassin-Benisti. Rev. Neurol., 1914, p. 592.
30. Eisenlohr. Berlin. klin. Wochens., 1887, p. 781.
31. Pierson. Volkmann's Sammlung klin. Vorträge, No. 229. Innere Med.,
No. 79.
32. Langdon. Journal A. M. A., Vol. 44, p. 216.
33. Strümpell. Deut. Arch. f. klin. Med., Vol. 64, p. 146.
34. Singer. Prager med. Wochens., 1887, p. 143.
35. Raymond. Jour. de Méd. et de Chirurg. Pratique, 1903, p. 330.
36. Rhein. Jour. NERV. AND MENT. DIS., 1913, p. 528.
37. Minkowski. Arch. f. Psych. u. Nerven., 1891-92, Vol. 23, p. 586.
38. Darkschewitsch and Tichonow. Neurol. Centralbl., 1893, p. 329.
39. Dejerine and Theohari. Semaine Méd., 1897, p. 453.
40. Mirallié. Rev. Neurol., 1906, Vol. 14, p. 702. Reported in detail in thesis
of Laurans.
41. Alexander. Arch. für Psych. n. Nerven., Vol. 35, p. 778.
42. André Thomas. Rev. Neurol., 1907, p. 1273.
43. Oppenheim. Lehrbuch der Nervenkrankheiten, Berlin, 1913.
44. Crouzon. Un cas de tétanos cephalique avec diplégie faciale. Rev.
Neurol., 1900, Vol. 8, p. 402.
45. Rolleston. Rev. of Neurol. and Psych., 1906.
46. Oppenheim. Berlin. klin. Wochens., 1887, p. 781.
47. Brasch. Neurol. Centralbl., 1891, p. 260.
48. Bandoïn and Chabrol. Rev. Neurol., 1910, Vol. 19, p. 124.
49. Inglesi. Rif. Med., 1892, VIII, No. 257.
50. Lévy. Contribution à l'étude des diplégies faciales totales, Thèse de Paris,
1902.
51. Barkas. Lancet, 1895, I, p. 217.
52. Lunz. Deutsche med. Wochens., 1894, November 22, p. 886.
53. Gaspero. Aerztl. Centr. Zeitung., Vienna, 1902, Vol. 14, p. 393.
54. Popoff. Neurological Monitor. (Russian.) 1907, Fasc. II.
55. Marinesco. Roumanian Neurolog. and Psych. Society, May 27, 1907.
56. Meluzoff. Voenno Med. Jour. (St. Petersburg), 1914, 1c. 34, Med. Spec.
p't. p. 53.
57. Arzumanoff. Jour. Neuropat. i. Psikhiat Korsakova (Moscow), 1910,
Vol. 10, p. 525, and Obozr. Psichiat. Neurol. (St. Petersburg), 1910,
Vol. 15, p. 676.
58. Bruzelius. Zentralblatt f. Nerven., 1887, p. 628.
59. Strube. Inaug. Dissertation, Berlin, 1881.
60. Darkschewitch. Neurolog. Centralbl., 1898, p. 60.
61. Rosenow. Etiology of Acute Rheumatism, Articular and Muscular. Jour.
of Infectious Diseases, January, 1914, p. 61.

Society Proceedings

AMERICAN NEUROLOGICAL ASSOCIATION

MAY 8, 9 AND 10, 1916

The President, DR. L. F. BARKER, Baltimore, in the Chair

(Continued from page 250)

STOCK-BRAINEDNESS. THE CAUSATIVE FACTOR IN THE SO-CALLED "CROSSED APHASIAS"

By Foster Kennedy, M.D., F.R.S.Edin.

In this paper the following cases were reported and considered:

Patient	Individual Handedness	Stock Handedness	Lesion	Physical Results of Lesion	Speech
Male, æ.t. 25.	Left- handed.	Right- handed.	Grenade wound. R. temporo-sphenoidal and occipital lobes.	Left hemiplegia. Left hemihypes- thesia. Left homonymous hemianopia.	No dis- turbance.
Male, æ.t. 36.	Left- handed.	Right- handed.	Left brain embolus.	Right hemiplegia.	Aphasia.
Male, æ.t. 23.	Left- handed.	Right- handed.	Right middle menin- geal hemorrhage. Skull fracture.	Left hemiplegia. Leftsided focal epi- lepsy.	No dis- turbance.
Female, æ.t. 22.	Right- handed.	Parents both left- handed.	Right rolandic tumor (gumma).	Leftsided focal epi- lepsy. Transient attacks of left hemiplegia.	Complete aphasia after each fit.
Male, æ.t. 28.	Right- handed.	2 brothers left- handed.	Right subcortical ro- landic glioma. R. subtemporal decom- pression.	Slight left hemi- plegia.	Aphasia.
Female, æ.t. 67.	Right- handed.	Mother, brother, daughter all left- handed.	Right brain hemor- rhage.	Left hemiplegia.	Aphasia.

Many cases cited by Marie and Moutier demonstrated aphasic eccentricities similar to those here put forward.

In none of them, however, was there any investigation of the prevailing type of handedness in the stock—an omission which quite probably vitiates their value as evidence supporting the assailants of the classical theory of the aphasias. It has not been the custom to make, in any systematic fashion, an investigation for a lefthanded trend in the antecedents of aphasic patients.

It would appear from the cases reported herein that this trend, when present in the stock, may produce, in the few righthanded individuals of the sinistral stock, a condition of brain similar to their collateral relatives and ancestors, with the result that the speech area in such persons becomes developed in an ectopic position.

Likewise, a lefthanded person occurring eccentrically in a righthanded

stock is dominated by the trend of that stock rather than by his own individual peculiarities.

Dr. Hugh T. Patrick said he would not venture to discuss Dr. Kennedy's paper, but would simply recall that about thirty-three years ago when he was a medical student Dr. Janeway gave a sort of rule of thumb to decide who was lefthanded; a rule which seems to work pretty well. That is, a lefthanded person must be a lefthanded writing person. All other activities are of less importance. Dr. Kennedy's first three patients were righthanded writers; or at any rate they could write with the right hand, therefore they were not lefthanded people.

Dr. Joseph Collins said it is currently reported or spoken of in literature that the majority of children are lefthanded. That is widely believed. However, credible statistics show that only about 5 per cent. of adults are lefthanded. There must be a serious mistake on one side or the other. Dr. Collins is inclined to think that it is on the side of those who believe that children are all lefthanded or that the majority of them are lefthanded. Second, to all rules there are exceptions. It is quite possible that some of these cases referred to by Dr. Kennedy are exceptions to the rule which is that the speech area of lefthanded individuals is on the right side of the brain. If Dr. Patrick will substitute the word "fighting" for "writing" Dr. Collins will agree with him. If a man fights with his left hand he is lefthanded. If a man turns to the left he is lefthanded; that is, if a man does the primitive things of life, the things that are necessary in order for him to continue his activities, he is a lefthanded individual. If he does the acquired things, such as writing, he may not be. Dr. Collins said he is a lefthanded individual and he does all the things of writing, golf, drawing with his right hand, but in striking, at least in doing any of the fundamental things he is lefthanded. He doubts very much if any individual who has not lived with him in terms of great intimacy knows that he is lefthanded, because the things that are done *secundum artem* are all done with his right hand. Therefore suppose we assume with him that one who writes with his right hand is a righthanded individual we would arrive at false conclusions. And, finally, he is not at all sure that the injury to the brain of the case as reported by Dr. Kennedy was necessarily so extensive, judging from the report which he has given, as to put the speech area, or at least the executive part of the speech area, out of commission. It is to be recalled in the famous crowbar case there was great destruction of the brain but the brain acted in a normal physiological way. Then, finally, the executive speech area in man has temporal as well as individual variability. He is inclined to believe that the executive speech area may be vicariously assumed by areas of the brain adjacent to the region which ordinarily assumes that function, and that vicarious assumption will explain the majority of cases which are exceptional to the generally established rule.

Dr. Charles K. Mills said he felt more like responding to the discussion of Dr. Collins than to the paper by Dr. Kennedy, although both, of course, go together. It is not the primitive preservations that have to do with this faculty of speech and development of one or the other hemispheres, but the educational acquirements of the slowly developing brain. He believes Dr. Kennedy has really the right explanation. If the inheritance of speech occurs through many generations with the inheritance of righthandedness, the lefthandedness in a given generation is then a sort of accidental deviation, and it does not have the force that it would have if the lefthandedness had been a long inheritance. He believes in spite of what Dr. Collins has said that, as Dr. Patrick has pointed out, it is the faculty of writing which has most to do with the association of righthandedness with lefthandedness and the accompanying phenomenon of brain speech.

Dr. E. B. Angell contributed a case he saw some years ago in corroboration of the remarks of Dr. Kennedy. The patient came to autopsy at thirty-two years of age for brain tumor. When a child of five she had an infectious disease with a sequent thrombosis of two thirds of the operculum and part of the motor tract of the left hemisphere. As a child she had been righthanded. As the result of the hemiplegia and loss of the power of the right arm she had to use the left hand. She regained the power of speech early, though from that time the right arm grew very slowly. At puberty it was practically a "withered arm." At the autopsy the remains of an old thrombosis were found. The corresponding convolutions in the right motor hemisphere were not only much enlarged relative to the left motor tract but also relative to the neighboring convolutions of the same hemisphere. The cortex was also much thickened, showing the influence of the change from right- to lefthandedness as the child grew up to womanhood and had to earn her livelihood. It suggested how these accidents of childhood influence the development of the brain.

Dr. J. Ramsay Hunt in the interest of harmony between Dr. Mills and Dr. Collins suggested that Dr. Collins is both right and wrong, that some of his functions he performs with the cortex and some with the globus pallidus. Many acts, for instance, fighting, walking and running, must be referable to a motor automatic mechanism. So we see that a man can be rightsided both as regards the globus pallidus and the higher cortical mechanism.

Dr. Bernard Sachs said it is more than twenty years ago that he was intensely interested in this subject, and there are two facts in his mind we cannot eliminate from the discussion. It is a fact that the majority of children are in the ordinary sense born ambidextrous. Through educational methods they become absolutely righthanded later in life. Another point is that taking the cases of children, the loss of speech defect is associated with loss in both hemispheres about equally, and it is only later in life that the preponderance of the left hemisphere has become well established. He believes there are different groups of cases. The ordinary child born ambidextrous can be made a righthanded child. There are some individuals who never can be made righthanded. He positively believes the larger number of people are righthanded because they are made so by education. He would like to know why the right hand was given so tremendous a preference over the left. He does not think it is the superior power of the right hand as compared to the left, but there is some reason for the educational preference of the right hand over the left. There may be ancestral strains but that would only apply to a few individuals who cannot be made righthanded. The vast majority of people can be made righthanded.

Dr. William G. Spiller said he had had occasion to observe the correctness of the statement that a child born righthanded could be made lefthanded. A righthanded baby burned the right hand in a gas flame and was unable to use that hand during five or six weeks. During that time he used the left hand, and when the bandage and restraint were removed from the right hand he continued to use the left hand. It required training to induce the child to resume the use of the right hand. Undoubtedly if the effort had not been made to train the right hand the child would have continued using the left hand. This case was not cited, however, as evidence that righthandedness may not be congenital and associated with greater functional development of the left cerebral hemisphere.

Dr. Smith Ely Jelliffe said that when Dr. Kennedy read an introduction to this paper before the New York Neurological Society he (Dr. Jelliffe) suggested that his explanations were far from being satisfactory. They implied far too recent an origin to a deep biological trend. This biological trend could be traced back many centuries, indeed millions of years, and the

present explanations were much too trivial. With biologists Dr. Jelliffe assumed that the reasons lay in the most remote past and possibly, even probably, went back to an original problem of orientation to the sunlight.

He is in thorough sympathy with Dr. Kennedy's remarks that our present academic discussions are not well founded. They are even farcical. They fail utterly to take into consideration many most important biological facts. The right pineal eye of the earliest vertebrates, for example, and many illustrations of phototaxis which have produced definite dextrorotatory structures from Ordovician and Silurian times—fifty million years ago—more or less.

Struggle has determined dominant strains, and those animals which have oriented themselves northward, overcoming the difficulties of cold, have also oriented themselves definitely towards the sun. These have been the dominant races, which, if we can follow the paleontologist, were righthanded in the men of the old stone age—Pliocene and Pleistocene—of the Mousterian and Magdalenian cultures. Phototaxis has been an element in forming structure, as evidenced by the paleostracean ancestor of the vertebrate, and its modern representative *Petromyzon* with its well developed righthanded pineal and atrophied lefthanded eye. The vertebrate nervous system was developed along the lines laid down by this ancestor—at least so says Gaskell, who has devoted the most study to the question—and why not right here may not the origin of right- and lefthandedness have begun? At all events, the trivial explanations which think of the habit as having been fixed in the last few thousand years, are unworthy of serious discussion.

Dr. Francis X. Dercum said the right side of the child is larger at birth. There is more muscle tissue by weight in the right side than in the left. Further, the left hemisphere weighs more than the right and it is a legitimate inference that it is dynamically stronger, *i. e.*, more potent than the right. Righthandedness cannot be merely a matter of training. There are exceptional instances, of course, and we are all familiar with them, in which the right hand is injured and the left hand is trained but we cannot account for righthanded preponderance in this way. There is no doubt a profound morphological and biological reason for righthandedness such as the facts he cited indicate.

Dr. Alfred Reginald Allen said the blood supply of the human being and most mammals and vertebrates is not symmetrical with the vertical axis. It is probable that the left side of the brain may get a better blood supply than the right side of the brain.

Dr. Herman M. Adler said that during the past few years he has been making some cranial measurements, and has found a peculiar asymmetry which seems to be normal in regard to the parietal regions. In righthanded persons, the right parietal region is more prominent than the left. In all the cases of lefthandedness that he has been able to examine, the reverse is not found, but there is a marked symmetry between the two sides, that is, the left parietal region is about equal to the right. In only one case of lefthandedness has he seen a marked prominence on the left parietal region. The conclusion from this seems to be that most so-called lefthanded people are probably ambidextrous.

Dr. Joseph Collins said the first work he ever did on the anatomy of the brain he did on a parrot. He wanted Dr. Kennedy and Dr. Mills to say whether right- or lefthandedness develops the speech center or not, and, second, whether it is phylogeny or ontogeny that makes left- or righthandedness.

Dr. Foster Kennedy said the discussion was so profuse and varied that he could hardly attempt to reply to all questions in the time allotted. He was very grateful for the interest shown in the subject. Dr. Patrick's "rule of thumb" interested him greatly. He thought to prove its worth we would

have to examine a large number of cases of lefthanded writers with cerebral injury. In answer to Dr. Jelliffe's statement that he did not speak of the retrograde tendencies of lefthanded people, his omission was partly from lack of time and partly from pure tact! Speaking of Dr. Spiller's case of the child who having been righthanded had become through righthanded injury temporarily lefthanded, he would say that he found in his own household a servant whom he noticed handing dishes with her left hand. On being questioned she said yes she had been injured in childhood—she had gotten her right shoulder hurt and was unable to use it for a couple of years. Since then she had become lefthanded. She told him she had a mother and a brother who were lefthanded. She had been herself originally righthanded. She might not have become lefthanded so easily if she had not had laid down in her a stock-brainedness of unusual type. Before Dr. Sachs had stated that he believed that righthandedness was solely the result of education. Why should the human family of one accord throughout the world unanimously educate their children to use the right hand? There must be something innate, a tendency built into the organism. It would appear that there is laid down in everyone of us a stock-brainedness resulting in a right- or lefthanded trend. It depends upon the stock from which we come as to whether we are rightbrained or leftbrained people. Regarding the inception of righthandedness Dr. Kennedy wrote of the utilitarian idea of primal man finding that the man who shielded his heart did better in life than he who shielded his right side. This and other cognate considerations operating through æons of time may have initiated the now prevailing trend. This theory obliterates the dogma that it is impossible to transmit acquired characteristics. There are many biologists, however, who do not admit the truth of Weismann's dogma.

Dr. T. H. Weisenburg read a paper entitled *The Clinical Significance of the Defense and Muscle Reflexes*. (*See this journal*, p. 217.)

Dr. Hugh T. Patrick was sorry not to have heard the beginning of this paper. If he understood Dr. Weisenburg correctly, he thought that two statements made by him would need a little qualification; namely, that in acute anterior poliomyelitis and in destructive lesions of the lumbar and sacral cord, muscle jerks in the affected area are absent. That would depend upon the stage of the disease. Early in acute anterior poliomyelitis the direct myotatic irritability is increased. Later on when the muscle fibers have disappeared there are no jerks. In an acute or rapidly progressive lesion of the lower segment of the motor tract (cord to muscle) the muscle jerks are certainly increased. The Germans state that this increased direct myotatic irritability is indicative of a process of muscle degeneration. The same principle applies to cases in which the patient is the subject of a general intoxication or infection. In such cases the direct myotatic irritability is increased, as in tuberculosis. It is also sometimes increased in arteriosclerosis in cases in which the muscle is degenerating from arterial disease of its nutrient vessels.

Dr. T. H. Weisenburg said Dr. Patrick was entirely right in his statements. The points mentioned by him are covered in Dr. Weisenburg's paper. What he wished to emphasize is that it is the absence of the muscle reflexes over limited areas of the body which indicates definite loss of function in the related portions of the spinal cord. Their absence is just as important as the absence of the knee and Achilles jerks and gives an indication of the state of various segments of the cord not covered by tendon reflex arcs.

THE EFFECTS OF LAMINECTOMY AND SIMPLE EXPOSURE OF
THE CORD UPON THE REFLEXES AND UPON SOME
SYMPTOMS OF SPINAL DISEASE

By Pearce Bailey, M.D., and Charles A. Elsberg, M.D.

In a large number of spinal operations remarkable changes in the skin and tendon reflexes were observed. Laminectomy and exposure of the spinal cord frequently have a marked influence upon the symptoms and physical signs of spinal disease. In some instances complete and permanent relief have followed the operation.

Dr. E. Sachs said these cases that Dr. Bailey and Dr. Elsberg reported are all of extraordinary interest and he hoped that in the concluding remarks Dr. Elsberg would go into a further explanation as to his theory for the cause of these changes. Dr. Sachs believes that the change in circulation may account for it. There are two points which struck him forcibly as this paper was read, and these are that these changes only lasted at most forty-eight hours, frequently only twenty-four hours, and in the second place that with one or two exceptions most of the changes recorded were changes in which spasticity improved to the point of normal reflexes or in which normal reflexes subsided and became really subnormal. He asked Dr. Elsberg whether this phenomenon may not be due to a temporary loss of cerebrospinal fluid. He thought it has been demonstrated pretty conclusively that it takes from twelve to forty-eight hours for cerebrospinal fluid, if it has been lost in a considerable quantity, to reform, and the changes reported by Dr. Elsberg last about that time. In the second place, these symptoms described may be due to a cutting of the inhibitory influence of the central nervous system. May it not be that the temporary removal of the cerebrospinal fluid opens these central paths again and in consequence the inhibition of the central nervous system comes in play again?

Dr. James J. Putnam called attention in the first place to the fact that Hitzig many years ago reported certain effects due to laying bare the cortex of the brain. Simple exposure had sometimes a very considerable effect. Then, a great many years ago, Dr. Putnam had under his care a patient with an intramedullary spinal tumor which was operated for by Dr. Keen, of Philadelphia, with the result of finding that nothing could be removed. Some years later the patient developed very intense typically nerve-root pains in the arms, and Dr. Warren then operated. This time also nothing more was accomplished than laying bare the cord and affording free exit for the cerebrospinal fluid. To their great pleasure and surprise, however, the patient's pain went away and never came back again as long as he lived, which was for several years longer. Dr. Putnam had frequently used lumbar puncture for the relief of dizziness, following the method of Babinski, and sometimes with excellent results. In trying to explain the favorable result in these cases he could not find any better way to account for it than that it broke up the pain-habit. Perhaps it is to such an influence as this that the good effect of operation in Dr. Bailey's cases was in some measure due.

Dr. Alfred Reginald Allen said that the dryness obtained in the field of operation may cause dryness of the posterior roots over a period of very many minutes, and it may be that some permanent alteration of the posterior roots occurs in this way.

Dr. Foster Kennedy suggested to Dr. Elsberg that in any operation many factors enter into the procedure. One is the anesthetic. One has seen abolition of deep reflexes in cranial as in spinal cases, during the period of recovery from the anesthetic, and further an extensor plantar reflex not change to flexor, but vanish and later reappear as before. He would put

before Dr. Elsberg the idea that the anesthetic may have produced in his cases the peculiar phenomena described.

Dr. Francis X. Dercum said this discussion recalled to his mind some experiences he had with the late J. William White at the Philadelphia Hospital, quite a number of years ago, in which they noted a persistent improvement in one of their cases for which they could not account; they found no lesion in the cord. Dr. White wrote a paper upon the subject entitled "The Effect of Operation Per Se." They thought it due to some unexplained improvement of nutrition, something that brought more blood in the healing process to the wounded structures, and that in this way the nutrition of the cord itself was raised.

Dr. A. S. Taylor said that work that he had been doing for a couple of years may perhaps throw some sidelight on the matter under discussion. During that time it has been his custom to examine the urine both before and after operation for the presence of acetone and diacetic acid. In a certain moderate percentage of the cases, regardless of the operative procedure, but in which general anesthesia had been given, there appeared both acetone and diacetic acid. These patients showed a very marked depression of both muscular and mental activity accompanied by headache, general malaise and anorexia. The acidosis disappeared in from thirty-six to seventy-two hours, in a very few cases persisting even longer. The general condition of the patients, as just noted, parallels in a striking manner the appearance and disappearance of the acidosis. It would therefore seem possible that inasmuch as in the spinal cord cases the condition noted is always one of depression of the preoperative reflexes, the condition may be the result of a general depression as indicated by the presence of acidosis, and that an investigation of the relation of acidosis to reflexes would be fruitful.

Dr. Joseph Collins corroborated many things Dr. Elsberg had said. He thought the explanation that Dr. Taylor has just given and that Dr. Kennedy gave in large measure is the proper explanation and the one that will stand the test. Dr. Elsberg said that these pathological reflexes are diminished in from two to twenty-four hours, afterwards he said from two to forty-eight hours. Dr. Collins thinks it is important to determine whether it is twenty-four hours or forty-eight hours. In the case that he had seen the diminution lasted twenty-four hours. He would suggest, therefore, and he will put this in practice in his own cases hereafter, that bicarbonate of soda be given before operation, and after, probably the most potent measure, to diminish acidosis. He ought to say that in several cases of laminectomy done by Dr. Elsberg for him there has been no improvement in any of the morbid manifestations of disease. In the first case Dr. Elsberg reported the operation was done five years ago, it was unquestionably a case of disseminated sclerosis, and it is within the experience of some, perhaps of many, that the quiescent period of disseminated sclerosis may last that long, although of course in the vast majority of cases it does not. It is most extraordinary how absolutely well this man has become and the length of time he has remained well. Dr. Collins agreed entirely with Dr. Elsberg and his agreement is largely due to being a witness of his skill in operation, that laminectomy is really not a dangerous procedure and there is much warrant for its performance in the diminution of symptoms of spastic paraplegia, and that it lays bare the seat of disease which may help us to make the real diagnosis and guide us in suggesting treatment.

Dr. Charles A. Elsberg said they also have a theory to explain these symptoms, but he did not think it is worth very much more than the other theories proposed. He has investigated these cases from various viewpoints. He has, for example, watched the condition of the reflexes in patients under prolonged anesthesia during and after operations on the cerebrospinal system

and other parts of the body; he has seen the reflexes suppressed for a few hours, until the patient was fully awake. In the patients in whom nothing was done to the spinal cord itself he has seen this remarkable depression of the reflexes. They paid considerable attention to the question whether the escape of cerebrospinal fluid had anything to do with the changes. In opening the dura they exposed the cord to a higher pressure than the normal. He had injected considerable amounts of saline solution before the dural sac was closed by suture, but the examination of the reflexes showed nothing different from that of the patient in whom the spinal fluid that had escaped had not been replaced by saline solution. After the withdrawal of fluid by lumbar puncture the normal reflexes will often disappear for a time, but never for longer than twenty-four hours. In a number of their patients the reflexes could not be obtained while the patient was on the operating table, and for a period of about forty-eight hours thereafter. That pathological reflexes, exaggerated knee jerks, ankle clonus, etc., may return to the normal after a simple laminectomy and exposure of the spinal cord is the significant change for which they have no satisfactory explanation. He is unable to speak about the question of acetone. He has examined a number of patients who had acetonemia and they regularly show a depression of normal reflexes. He did not remember that any of these patients were operated upon for disease of the nervous system.

INTENTIONAL HYPERTONIA—A CONTRIBUTION TO THE CORTICAL LOCALIZATION OF MUSCULAR TONUS

By Sidney I. Schwab, M.D.

A brief consideration of the important theories of muscle tonus. The evolution of the tonus reflex from spinal cord to the cortex. Relation of the emotion and will to the production of tonus. Résumé of recent experimental work on the localization of tonus. A brief account of clinical evidence in favor of the term Intentional Hypertonia. Case reports. Conclusion.

Dr. Southard called attention to certain phenomena in dementia præcox as related with the intentional hypertonia described by Dr. Schwab. Dr. Southard spoke of his own correlations between hypertensive muscular conditions (catatonia) and lesions in different parts of the central nervous system, especially in the parietal lobe.

Dr. Charles K. Mills was deeply interested in the general subject of localization and he had been for many years. Recently his attention has been especially directed to the localization of tonic centers but he had not much to add to what he had already written about this subject. He became convinced from his personal observation on a number of clinical cases and on the results of observations in three cases with necropsy, also from the standpoint of what might be regarded as a philosophical or biological consideration of the subject, that in the human being at least tone is a cerebral function. He had come to disregard what he had learned and read and taught, following Luciani and Hughlings Jackson, that the cerebellum is the main seat of tone. It is not the organ of tone but of synergy. That there is atonia or some aberration of tonic activity in cerebellar cases does not make it necessary to believe that the cerebellum is the organ of tone. The point is simply what he has already called attention to before this Society, that the three great motor functions are energy, synergy and tone, and in order that there may be perfect motor expression these must be normally united. In case of cerebellar disease there comes a disunion between the regions of the brain which are concerned with energy, tone and synergy, and hence you may get not only asynergy but other manifestations which

may to a certain extent seem to indicate aberrant tonicity and apparent loss of power or asthenia. With regard to the localization of tone Dr. Mills believes, and he has given his reasons in a paper published some time since—that it is in the midfrontal and prefrontal regions especially that toneic innervation is cortically represented. He examined the literature very extensively and must confess that he did not find very many strongly confirmative cases regarding the cortical localization of tone, but some cases of others observers—Italian, German and others—seem to bear out his view. Bilateral, cortical lesions give the phenomena which especially bear out the idea that the midfrontal or prefrontal regions are especially the cortical centers for tone. He believes the cortical region is connected with the lenticula in such a way that both take part in toneic innervation. A very close study of this subject shows that at least in human beings there is a separate region concerned with muscle tonicity, which region may be regarded as a rendezvous not only for sensorial but for higher psychic impressions which are delivered eventually as toneic stimuli to the motor or pyramidal system.

Dr. Smith Ely Jelliffe thought we are entitled to say that there is no one tonus, there are at least three tonuses. There is a tonus which is purely physico-chemical. Modifications of the tissue tension from metabolic disturbance are its symptoms. The muscular dystrophies, the myopathies, edemas, tetany, are instances. In one of these changes in the calcium metabolism accounts for the tonus modifications. Sensori-motor tonus changes are those usually discussed under this head by organic neurologists. Here Sherrington's masterly studies leave nothing to be discussed. A third group are the psychogenic tonus difficulties, such as are seen in katatonia, for instance. Occasionally these are so marked as to be accompanied by vegetative neurological disorders, but in the main the tonus is purely induced by psychogenic activities. This group Dr. Schwab only touches upon. The question of tonus is a broad one and the vegetative and psychogenic level mechanisms are least understood.

Dr. Sidney I. Schwab said the suggestions of Dr. Southard were extremely important. He would like to express his gratitude for the paper by Dr. Mills, work which he thought forms the final connecting link to the work proper by Sherrington.

(To be continued)

BOSTON SOCIETY OF PSYCHIATRY AND NEUROLOGY

APRIL 20, 1916

The President, DR. EDWARD B. LANE, in the Chair

DEVELOPMENTAL PSYCHIATRY

By Walter B. Swift, M.D.

The speaker said that developmental psychology is a new idea which has been found useful in the work of the speech clinic at the Psychopathic Hospital. As the subject is a very large one he confined himself to a definition. In a previous paper given before this society he showed that in his work in neuropathology he found a student type, a dominantly hearing, slightly collaborating and writing individual. He had been trying to change this type to a seeing, largely collaborating, talking individual. The changing of the type of individual is what is meant by developmental psychology. A new mental action is formed. Most people fall into two large divisions, the visualizing and the non-visualizing. He had succeeded in changing some of the non-visualizing patients into visualizing ones. This is another illustration of developmental psychology. It is possible thus to change the level of a person's mental attitude and reshape personality.

END RESULT OF OPERATION ON ULNAR NEUROMA

By James B. Ayer, M.D.

Dr. Ayer showed a case of ulnar paralysis which he reported some months ago in the *Boston Medical and Surgical Journal*, 1915, CLXXIII, 585-589. At that time there was a very slight return of function, one year after operation. The increase in function in the second year has been marked. The patient now presents very little atrophy, no disorder of sensation, no muscular weakness, and only slight quantitative changes in the electrical reactions. A brief summary of the case is as follows: May, 1909, small cut just above elbow; July, 1909, seen by visiting neurologist at the Massachusetts General Hospital with note "apparently no nerve involvement"; October, 1909, anesthesia, pain, weakness, RD, of ulnar nerve distribution; January, 1910, operation, nerve found largely cut across, ends approximated, otherwise not disturbed from scar tissue; February, 1914, no improvement following operation, and painful mass in the scar; operation, excision of old scar, ulnar freed; May, 1914, another tumor in scar which soon went away; February, 1915, characteristic ulnar deformity with very little return of function. It is evident that there has been a marked improvement in two years, while the return of function in one year was very slight.

Dr. Paul said: If he remembered rightly, the whole nerve was not cut in the original injury. Probably there was always some function. He doubted whether the restoration is complete even now.

Dr. E. W. Taylor, Boston, could verify Dr. Ayer's statement that function has very largely returned in this patient. He also remembered that a year ago there was still so considerable a loss of power and sensation that further return seemed at least unlikely. Cases carefully studied as this has been are of distinct value in reaching practical conclusions regarding nerve regeneration. Of the two theories each of which has its enthusiastic advocates, a case of this sort would seem to uphold the idea of regeneration only from the proximal stump. If regeneration occurred also in the periphery, one would certainly expect the recovery to be very much quicker, occurring in the first year.

TWO CASES OF EPIDURAL ABSCESS

By William J. Mixer, M.D., and Walter E. Paul, M.D.

Dr. Mixer reported the following case:

F. H., age 17, seen February 18, 1916. Family history and past history negative except for furunculosis of the face since adolescence. Pain in the left shoulder and left side for two weeks. Stiffness and weakness of both legs for five days. Four days before seen had a typical spastic paraplegia with a temperature of 101°. When seen by Dr. Mixer he had a temperature of 105.2°, a white count of 30,000, paralysis of legs, anesthesia up to VII-IX dorsal level, priapism, retention and constipation. Lumbar puncture, clear, not under pressure, slight coagulum on standing. Laminectomy III-VI dorsal, showing an abscess below the epidural fat outside the dura. No evidence of focus of infection seen. Patient died a few hours after operation and there was no autopsy. Culture showed pure culture of *Staphylococcus aureus*. The abscess seemed to have stopped in the epidural fat much as it does in perirenal fat from furunculosis. It seems that many of these cases have been dismissed when there might be a chance to do something surgically.

Dr. Paul reported the case of a 43-year-old man who received a slight wound from a shingle scratching the right breast near the nipple. An abscess developed, broke, and healed in about five weeks.

Three weeks after the injury to the breast pain developed in the left

back with pleurisy, and there was a temperature of 102° for several days. The general condition improved but the pain continued. Some thirty-four days after the wound he entered the Quincy Hospital under Dr. Hunting. He had pain in his back, some weakness of his legs with fever. Suddenly, after four days in the hospital, he found he could not use his legs and he had to be catheterized. There was pain and stiffness of the back. The knee jerks were present and there was some movement of the toes only in the lower extremity; so the paraplegia was not absolute. Sensation was not lost but there was hypesthesia below the seventh dorsal level. Poliomyelitis was considered likely but a transverse myelitis could not be ruled out.

The spinal fluid was yellow and sterile, and of low cell content; Dr. Ayer was of the opinion it was a pressure fluid.

Two days after Dr. Paul's visit there was a complete sensory and motor paraplegia and death occurred forty-six days after the wound.

The post mortem disclosed a prevertebral abscess and an intraspinal but extradural purulent collection compressing the cord for several segments, with the chief pathological focus at the fifth segment.

Apparently the infection found its way from the breast abscess along the rib to the prevertebral area and the intravertebral space. The infecting organism was *Staphylococcus albus*.

Dr. F. T. Lord said the case first reported was seen by him in consultation on the seventeenth of February, the day before he was seen by Dr. Mixer, and presented an interesting diagnostic problem.

The patient had then been ill for sixteen days, complaining throughout of headache and pain in the left shoulder, the left side of the neck, the axilla and the back between the shoulder blades. Fever was first noted on the third day and had been intermittently present since. He had vomited three days before Dr. Lord saw him.

Involvement of the lower extremities first became manifest four days before with a sensation of pins and needles in the legs and feet, with rapid increase of the disturbance to weakness and spasticity three days before and a termination in complete motor paralysis on the day of Dr. Lord's visit.

Examination showed complete flaccid paralysis of both legs, with entire absence of sensory perception throughout the right leg and the right side of the trunk as far upward as the level of the sixth rib in the mammillary line. Over the entire extent of the corresponding area on the left side, touch, pain and temperature perception was present but diminished. At the upper level of the sensory disturbance was a girdle of cutaneous hyperesthesia. The knee jerks were present and equal. The plantar reflex was normal. Muscle sense was impaired in both legs. The neck was stiff and there was a double Kernig.

The clinical picture was that of a myelitis of the compression type. The fever and leucocytosis suggested a suppurative process in explanation of the findings and the negative spinal fluid made it seem probable that pus might be found within the spinal canal and outside the dura.

It was unfortunate that Dr. Mixer's courageous surgical intervention did not accomplish more than the establishment of the diagnosis.

Dr. J. B. Ayer said the lumbar punctures in these cases were not at all negative as they both showed spontaneous coagulation, greatly increased proteins and a low cell count. One fluid was yellow. This is what the French speak of as "coagulation massive et xanthochromie," and it means pressure on the cord. The yellow color or xanthochromia may be pale or deep, the fluids contain fibrin and will coagulate, and show a large amount of protein. They are non-inflammatory as there are only a few cells. This type of fluid is probably pathognomonic of pressure upon the spinal cord. The literature on this subject has largely been French or German and only one or two cases

have been reported in American literature. The gold sol reaction seems to be the least helpful in these cases. In Dr. Paul's case at autopsy pus was found at the first cut over the spines of the vertebrae. It had infiltrated the back muscles and was found over the dura compressed into the shape of the canal. The paravertebral glands were destroyed and the infection probably traveled in the intercostal lymphatics from the breast to the back.

THE TREATMENT OF PARESIS BY INTRAVENTRICULAR INJECTIONS OF DIARSENOLIZED SERUM, WITH PRESENTATION OF CASES¹

By P. C. Knapp, M.D.

Dr. Knapp stated that he had had experience of about five hundred intraspinal injections with Dr. Sanborn in over a hundred syphilitic nervous cases in the last three years and that he was an ardent believer in this form of treatment. His success had been better in the spinal cases than in the cerebral cases. Many of the tabetic cases improved remarkably but the paretic cases did not do so well. The intraventricular treatment first proposed by Dr. Graeme Hammond and Dr. Sharpe he had had an opportunity of seeing at the Post-Graduate Hospital. Dr. Knapp then spoke of the experimental work of Goldman and Symmers and described briefly the surgery of intraventricular injection. Two cases were shown. The first was a very hopeless case of paresis, aged forty, extremely demented, with symptoms for one and one half years. The Wassermann in the blood and spinal fluid was triple positive but in the ventricular fluid was negative. He was given 0.6 gm. of diarsenol and serum into the ventricle. Nine days later he was better and again given 0.6 gm. His pupils which did not react to light before now react promptly. He is so much better he is able to work four days a week. The patient was shown and Dr. Knapp said that he would have his third injection in two weeks more.

The second case was a case of very marked paresis who had had two intraventricular injections and who was markedly improved. His pupillary reaction had also returned.

Dr. Knapp said that he did not feel that we could draw much inference from only two cases under observation so short a time, but that he could say that the operation gave no bad results and that there was certainly a very striking improvement in the physical signs. We do not often see pupillary reactions come back and knee jerks return. It would seem as though it were a very hopeful method of treatment.

THE MENTAL EXAMINATION OF REFORMATORY PRISONERS

By G. G. Fernald, M.D., Concord, Mass.

The subjects of this examination were the prisoners at the Massachusetts Reformatory from sixteen to twenty-four years of age. This age is at the close of the formative period and is most important in mental development. It is noted that after residence in the reformatory the prisoners are more teachable and introspective. The psychonological interview is therefore in the later part of their period of incarceration. Sometimes more than one interview takes place. The old method of examination by the uniform application of tests has been abandoned for the clinical psychiatrist's method. The reasons for this change are: (a) too time consuming, (b) tests not well adapted to all subjects, (c) did not reveal character defects, (d) tests too impersonal. The examination is based on an outline advocated by Dr. W. E.

¹ Reported in Boston Med. and Surg. Jour., 1916, CLXXV, p. 24.

Fernald. Dr. Fernald then presented a survey of his work. The men were divided into adult, subnormal, and segregable mental classes. The most striking characteristic of the last group or defective delinquents is their lack of ordinary foresight and regard for consequences, often expressed in terms of (a) readiness to falsify, and (b) egotism and the lack of regard for the rights and claims of others. Dr. Fernald then spoke of the more detailed divisions of his survey, such as the accidental offenders, the responsible offenders, the alcoholics, the recidivists, the alcoholic degenerate, the congenital syphilitics and the psychopaths. Before examination a full systematically arranged information blank is filled out of the prisoner's life story. During the examination the examiner and his subject are alone and free from distracting stimuli. The interview must be personal and not dogmatic. His concluding remarks were as follows: "So the psychiatrist's method of examination with its flexibility in application and inclusiveness as to means employed enables classification of this group of mentalities. As employed in studying the rather rapidly shifting reformatory population it has been satisfactory: having enabled the tentative differentiation of the competent, deviate and deficient classes and their subdivisions into diagnoses of variety of mental departure with cross references to adult, subnormal and segregable."

Dr. Fernald said this interesting survey will add much to our knowledge of the defective delinquent. It shows how hard it is to classify the varied types. He thought the moron class in this group would be larger if laboratory-intelligence tests were made. Examination by the psychiatrist's method alone makes it more difficult to compare statistics with other institutions. It seems a pity to turn the segregable cases out into the community, as is done now. With the results of this survey in front of us, it is hard to understand why the really defective members of the criminal class are not permanently detained in custody, as is already provided for by a law on the statute books of Massachusetts.

Dr. Paul asked how many prisoners return to normal life.

Dr. G. G. Fernald replied that the figures are not available, but it is estimated that 75 to 80 per cent. of released inmates are not again heard from in criminal circles. The number of cases returning to the reformatory is somewhat greater than it was formerly, a result due in part to the out-working of the probation system. Under present conditions there seems to be no place for the segregable class except the reformatory. When the attempt is made to segregate, the separation ought to be absolute. The segregables should not be in the same buildings with the other men. About 15 per cent. are in this class.

MAY 18, 1916

The President, DR. EDWARD B. LANE, in the Chair

REPORT OF FOUR CASES OF SYPHILIS OF THE SPINE AND THREE CASES OF SPONTANEOUS FRACTURE IN SYPHILIS

By W. J. Kerr, M.D. (by invitation)

Charcot spine is a rare involvement of late syphilis. Only two cases are recorded out of 300,000 cases seen in the Out-Patient Department of the Massachusetts General Hospital in the past thirteen years. There are about 125 cases in the literature. Spontaneous fractures have been reported in about an equal number of cases of central nervous system syphilis. Charcot joints, other than lesions of the spine, are fairly common manifestations of late syphilis.

Case 203,380. Male of 42 with an untreated chancre eighteen years previously gave a history of tabetic symptoms for seven years, spine trouble for

three years with progressive transverse myelitis. There was moderate kyphosis at second lumbar, without spasm or rigidity. X-ray, specific disease of spine, dilated aortic arch. There was no evidence of tuberculosis. Serological tests on blood and spinal fluid showed syphilis. Cells and protein in spinal fluid increased. No improvement in spite of vigorous antiluetic treatment. Diagnosis: Charcot spine.

Case 206,919. Male, 42. Tabes of seven years' duration, optic atrophy for seven to eight months. Stiff back for four years. Serological tests positive for syphilis both on blood and spinal fluid. Cells and protein tests increased. X-ray showed pathological process at first and second lumbar vertebrae suggestive of typhoid spine. Later X-ray showed hypertrophic changes with destruction of intervertebral disc between first and second lumbar. Patient had typhoid fever twenty-two years previously and pulmonary tuberculosis seven years previously. No evidence of active tuberculosis at present. Diagnosis: probably Charcot spine, possibly tuberculous. Typhoid spine unlikely.

Case 24,509. Male, 41 years. Syphilitic infection at 27. Tabetic symptoms for six and one half years. Argyll-Robertson pupils, ataxia, loss of knee jerks. Mental symptoms suggesting general paresis. Trouble with spine for one year. Kyphosis in lumbar region. X-ray shows destruction of spine at second and third lumbar vertebrae. No evidence of tuberculosis. Diagnosis of Charcot spine.

Case 109,524. Male, 52. History of tabetic symptoms for fourteen years. Charcot hip for five years. "Gastric crisis" for four years. Curvature of lumbar spine with hypertrophic changes on vertebrae. Blood Wassermann strong positive. Improvement under antisyphilitic treatment.

Case 284,806. Male, 54. Charcot hip joint with spontaneous fracture of neck of femur. Charcot knee, by X-ray. Wassermann: suspicious.

Case 206,588. Female, 43. Tabetic symptoms for ten years. All physical signs of tabes. Swelling of left ankle. No history of injury. X-ray shows fracture of internal malleolus, with periosteal changes of adjacent position of tibia. Blood Wassermann negative. Spinal fluid: cells slightly increased; protein tests slightly positive; Wassermann, weak positive; colloidal gold, syphilis. There was slight improvement of tabetic symptoms under antisyphilitic treatment. Diagnosis: tabes with spontaneous fracture of internal malleolus of tibia.

Case 204,588. Male, 49. Chancre at 20 years, poorly treated. Shooting pains in legs for eight years. Fracture of tibia nine months ago while walking on level ground; eight weeks in cast. Worked three days and then broke both tibia and fibula at site of old fracture. No union since. No pain at any time. Patient has stiff pupils, widely dilated. Ankle jerks and knee jerks increased. No ataxia. Blood Wassermann suspicious; spinal fluid, cells increased; protein tests, faint positive; Wassermann, suspicious of syphilis. Diagnosis: spontaneous fracture in central nervous system syphilis.

Dr. E. W. Taylor said in connection with the cases which Dr. Kerr had reported with the X-ray findings, it may be of interest that a condition of the bones of the ankle in a case of tabes finally diagnosed by the X-ray recently under observation was accompanied with most extreme pain, especially when weight was born on the foot, contrary to the generally accepted idea that the tabetic joint disturbances are painless.

SPORADIC THOMSEN'S DISEASE

By Dr. E. W. Taylor, M.D.

The patient was a man of 24, born in Italy. He is the only one of a large family who suffers from the disease or in fact any disorder of the nervous

system. His difficulty began before he was ten years old and has continued intermittently since that time. It is especially severe in the morning and tends to improve distinctly in the afternoon and evening. He has been obliged to give up his work in a shoeshop because of the impossibility of using his legs properly in the manipulation of his machine, on account of the cramp-like spasms. Apart from his muscles he shows no abnormality of the nervous system or otherwise. He is a man of unusual physical development, the individual muscles being large and apparently of great strength. He has, however, always felt himself weak in spite of his muscular development. There is no evidence of pseudo-hypertrophy. He has difficulty in rising from a sitting position or in making muscular movements of any sort. The muscles supplying the cranial nerves are rarely affected, although he has at times had slight difficulty in swallowing. The muscles when he is in the midst of an attack show the characteristic electrical reaction. The interest of the case lies in the facts that it long went undiagnosed owing, no doubt, to its intermittency; that it was at one time assumed to be hysteria, at another tetany, that the man has long periods of complete immunity from spasm and discomfort and that no other member of his family appears to be affected.

PSYCHIATRIC FAMILY STUDIES

By A. Myerson, M.D.

The contents of the paper may be divided as follows:

1. A brief review of the literature, special attention being paid to the doctrine of polymorphism.
2. An analysis of the marriage rate of the insane as shown in Taunton State Hospital figures. This part of the work demonstrates:

(a) That of four great groups of the insane, namely, alcoholic insanity, general paresis, dementia præcox, and senile dementia, great differences in the marriage rate are found.

Males suffering with senile psychosis marry in somewhat less proportion than does the total population of that age.

The male patients suffering with general paresis marry in almost the same proportion as does the total population of the same age group.

Male patients suffering with alcoholic psychosis not only marry in less proportion than do the members of the other two groups but, therefore, marry in very much less proportion than does the total population of the same age.

The dementia præcox group shows by far the lowest marriage rate, not only because the individuals enter the hospital young, but even as compared with the total population of the same age group.

In other words, marriage offers a barrier to the propagation of dementia præcox, in so far as males are concerned, but offers little or no barrier against the race damage caused by the kind of syphilis that leads to general paresis. In alcoholism there also seems to be a mechanism operating against marriage.

The females of the same groups show about the same features in senile psychoses and in general paresis. In alcoholism there is no such dropping off in the marriage rate as is seen in the male cases. In the dementia præcox group the dropping, while great, is not nearly so extensive as in the male cases. In other words, and this seems to be very important, the female dementia præcox has nearly twice the chance of marriage that the male dementia præcox has, and it is true, as figures from all over the world show, that the female insane tend to have insane daughters in greater proportion than they tend to have insane sons. We have a simple explanation of the preponderance of females in insane statistics in the greater marriage rate of female insane.

(b) The heredity taint of the sane and the insane, as compiled by Koller and Dien, is reviewed and criticized from their figures. It seems evident that we need to be specific in our explanation of the heredity, that the degree of the taint is very important and that nervous disease per se has not the importance usually attributed to it in determining insanity in a descendant.

(c) The statistics of 640 families, as studied at Taunton State Hospital. These comprise the related families that have appeared in the history of the hospital from 1854 to 1916. The facts thus elicited are analyzed from the standpoint of relationship and the standpoint of so-called "anticipation." This phenomenon is emphasized by Mott, which briefly expressed is the earlier appearance of insanity in a descendant than in an ancestor. Luther, Jolly, Albrecht, Rosanoff, and others show this phenomenon to be very marked. The analysis of the Taunton State Hospital figures also brings into prominence this anticipation. Certain objections are raised against laying over-emphasis on the phenomenon, largely because of the manner of collecting the statistics. Moreover, analysis of families in which disease has been prevalent for several generations does not show anticipation to so marked an extent as those in which two generations alone are represented.

(d) Certain groups of cases are analyzed in detail according to the type of disease in the parent. It is then found that, on the whole—(1) Paranoid diseases of the non-dementing type in the parent are usually followed either by paranoid diseases in the descendant or by dementia præcox. (2) Catastrophic mental diseases in the parent are usually followed by dementia præcox in the descendant. (3) The senile psychoses are followed by a variety of diseases in the descendant. The interpretation of this phenomenon is explainable on the ground that the senile psychoses are, in reality, many diseases including a senile paranoia, a form of dementia præcox and a form of manic-depressive insanity, all somewhat colored by the general mental makeup of senility. (4) Dementia præcox is followed in the majority of cases by dementia præcox, usually in a more severe form and occurring earlier. Imbecility and epilepsy are not uncommon in the descendants of dementia præcox. One case of manic-depressive following a dementia præcox is noted. (5) The situation in regards to alcoholic psychoses and organic brain disease in the ancestors can not easily be given an abstract.

It is remarkable to note that in spite of different interpretations by most of the workers in family studies, that results closely corresponding to the above are recorded by Albrecht, Krüger, Luther, Jolly, Rosanoff, and others.

It is concluded in regards to the transformation of psychotic type occurring in two generations that there are two main currents, both leading towards dementia præcox in the descendant, one leading through manic-depressive insanity, though this is not so marked as to be beyond question, the other current leading through paranoia, the paranoid diseases and catatonias to dementia præcox. The course of events from dementia præcox is towards dementia præcox and race extermination, because of the lower marriage rate, and also towards imbecility and perhaps epilepsy.

The above conclusions apply only to those cases of two generations where the descendant enters the hospital and does not, of course, apply to those descendants who do not enter the hospital. Moreover, the situation is not so clear where three and four generations are involved, perhaps because these are few in number. It is also concluded, with Rosanoff, that a study of asylum cases alone throws only a partial light on the transmission of insanity.

(Paper to appear in full in American Journal of Insanity.)

Dr. Gregg said: Before drawing conclusions it is necessary to be sure of your premises. At the present time our knowledge of what is meant by dementia præcox is very nebulous, and until this knowledge is more definite we can not draw conclusions as to the inheritance laws involving dementia

præcox. Some investigators have an idea that dementia præcox is a glandular disturbance. Most of these glandular troubles are not simple but pluriglandular in their manifestation of symptoms. Why then should we consider the disturbances giving only mental symptoms, and disregard those involving metabolism and growth such as possibly the pancreas, thyroid and pituitary glands? Recently Dr. Gregg had seen two cases of dementia præcox giving a family history of diabetes. If dementia præcox is a type of disturbance involving the glands of internal secretion, surely an inheritance study should consider other types of glandular disturbances beside those giving mental symptoms. He agreed with Dr. Knapp upon the fatuity of drawing conclusions from nebulous premises.

Dr. Solomon asked Dr. Myerson what he would have to say concerning the type of case in which syphilis in the parent is followed by psychoneurosis or psychosis in the offspring. According to Mott, Nonne, Meggendorfer, Freud and others, such is the etiology in many cases. Where we have such an exogenous factor producing the difficulty, would you expect the descendants to follow some such order as you have here outlined?

Dr. Frost, referring to the reader's statement that the type of psychosis in the ascendants was, in general, but little regarded when it came to making a diagnosis, stated that it was their custom at the Boston State Hospital, and he thought in the other state hospitals as well, to make very careful inquiries on this point, that whenever possible abstracts from hospital records were obtained to show the diagnosis in cases related to their patients, and that in the staff meeting discussions on the diagnosis very great importance was attached to this information, especially as affecting the diagnosis between manic-depressive psychosis and dementia præcox.

He was inclined to think that no conclusions could be drawn from the figures showing the influence of heredity in the case of descendants of persons affected with senile dementia, and would regard the occurrence of mental disease in succeeding generations of such families as probably due to other causes than direct heredity.

Dr. Knapp said: If we study a family with Friedreich's disease, the persistence of the Hapsburg lip, or the degeneracy of the Juxes, we become pretty fixed believers in heredity, but if we consider the average study of the heredity of nervous and mental diseases, we become convinced merely of the futility of human effort. About ten years ago he attacked the doctrine of the psychopathic heredity with a special consideration of the investigations of Thomann-Koller and Diem, and, to his surprise, found that his (Dr. Knapp's) conclusions met with much more approval than he expected. The conclusions reached by different observers vary extremely—the psychopathic heredity of epilepsy, for instance, is estimated at from 11 to 87 per cent, and the similar heredity from 0.9 to 37.2 per cent. The statistics are based on wholly unscientific principles. Dr. Myerson had spoken of a certain doubt as to the value of including data from an uncle or aunt, but in some cases the uncle apparently means merely the aunt's husband, and cousins are included, ignoring the fact that the influence of a wholly alien stock is thus introduced. Furthermore, the statistics as to "insanity" in the family may be based on cases of paranoia or maniacal depressive insanity, in which we now think heredity of some importance, or of paresis where we know it plays no part. Dr. Myerson's study is of far greater value, for he has investigated the conditions in the individual form of disease. Although this study is of value, however, we lack studies which enlighten us upon the one vital point upon which we are called upon to pronounce an opinion, namely, given one of these forms of disease in the family, how many escape and what is the incidence of that disease in the family.

Dr. Myerson said he was sorry that the average study of the heredity of

mental and nervous diseases fills him with a sense of the futility of human effort. Fully aware of the poor technique and the gross errors that underlie most of the studies, he is by no means depressed but realizes that each effort lends some fact or series of facts to the structure we are painfully building up. Statistical studies may be very poor or they may be very good, according to the statistical knowledge displayed by the worker. To carp at them merely because they are statistical, is to ignore the fact that clinicians and laboratory workers yearly publish papers on work of little value. In other words, statistical study stands on exactly the same basis as does every other kind of study, to wit, it must be carefully done and controlled.

However, he wished to urge that his paper is in no sense a statistical study. It is a criticism of statistical work. It contains a good many figures but *essentially it is a study of individual cases which have occurred in an individual hospital, the Taunton State Hospital*. The families which have been studied have been observed by psychiatrists—intelligent notes have been made. While they had very few brilliant records, the general mass of records is trustworthy. The results obtained, therefore, are not statistical in the least—they are more or less intensive. No one realizes more than he did that it is necessary to study all the descendants of the insane in order to formulate any well established laws of heredity. In fact, he stated at the outset of this paper that that was the original plan but it was necessary to give it up, for the most of the cases, because of lack of funds.

Dr. Gregg's statement, that our knowledge of what is meant by dementia præcox is very nebulous, is a statement with which he took deliberate issue. Our knowledge of the causes of dementia præcox, our knowledge of its pathology is, of course, fragmentary and nebulous, but our knowledge of its symptomatology is very definite. It is true we make errors in its diagnosis, but so also do we make errors in the diagnosis of tuberculosis. *Its relation with internal gland disturbances is nebulous*. Its relationship to diabetes is, he is very certain, only occasionally coincidental. He examined in his laboratory the urines of hundreds of patients yearly and he is sure that diabetes is not related to dementia præcox in any way. Because our knowledge of dementia præcox is imperfect is the very reason for undertaking such a study as this one. It is true that a hereditary study would be better based if we knew all about the disease, but that is merely a "council of perfection" and ought not to be argued to discourage research.

Dr. Frost took issue with his (Dr. Myerson's) statement that the type of the psychosis in the descendant is in general but little regarded when taking the family history. It may be the custom at the Boston State Hospital to do this. If so, Boston State Hospital is decidedly exceptional in this regard. Most hospitals and most clinical records that he had examined content themselves with the statement that insanity exists in the family in such and such a member of it. The age of onset, the character of symptoms are usually disregarded. Of course, when there is a record to be obtained from another hospital, then such details are obtained. Dr. Frost is inclined to believe that the influence of heredity can be disregarded in the case of descendants suffering with senile dementia. A careful study of the cases, which unfortunately Dr. Myerson had not had time to cite in detail, would convince him to the contrary. His own cases and the cases cited in the literature abundantly prove that the term is used to cover many diseases, the most of which have a distinctly hereditary significance.

Dr. Solomon's statement is very interesting. Dr. Myerson is firmly of the belief that an exogenous factor such as syphilis can start a family stock downward. In his own cases he had purposely omitted those in which paresis in the ancestor was followed by a psychosis in the descendant, for he felt that would complicate an already difficult problem. He felt that an investi-

gation into the descendants of the syphilitic would be of enormous value, especially in view of the fact which has come out in this paper, to wit, that the syphilitics marry in about the same ratio as does the general population.

NEW YORK NEUROLOGICAL SOCIETY

JUNE 6, 1916

The President, DR. WILLIAM M. LESZYNSKY, in the Chair

MYXINFANTILISM DUE TO PITUITARY DISEASE

By H. Climenko, M.D.

Dr. Climenko classified the case as myxinfantilism of the Brissaud type, with clinical symptoms of hypopituitarism, although Brissaud had held the thyroid responsible for the disease. The patient, a girl, 11 years old, was first seen in March, 1916. Family history showed that the father, sisters and brothers were of unusually large size. The mother had a protruding chin. She had had two miscarriages and there was also a history of tuberculosis on the father's side. Repeated Wassermann tests of the mother and child were negative. The patient was normally born, breast fed, and, according to the mother's statement, the child spoke at one year, and began to walk at two years. There was delayed teething, the teeth beginning to come at two years. At the age of two the mother noticed that the child was smaller than average children and she applied to a hospital. Powders were prescribed there, which, according to the mother, helped the patient a good deal. The nature of the powders could not be ascertained. The child was brought to Dr. Climenko because she did not grow, was backward in school, and was behind children of her age. There was no abnormal mentality. The patient showed the appearance of a child of four years; facial expression was intelligent. The face and mucous membranes were pale; there was an increased layer of adipose tissue; the abdomen was protruded, and the umbilicus was down as low as that of the infantile type. The cranial nerves gave negative findings; the optic discs were rather pale, but there was no change in the visual fields, and acuteness of vision was normal. Reflexes and lungs were normal. Heart showed a systolic apical murmur not transmitted. Weight 46 lbs.; height 98 cm.; circumference of chest 59 cm.; circumference of abdomen 63 cm. The X-ray showed an encroachment upon the cavity of the sella turcica by bony projections from the anterior as well as the posterior walls of the sella. A peculiar mottling of the frontal and parietal bones was shown. The anterior fontanelle was not completely closed. After 200 gm. of glucose given on a fasting stomach there was no sugar in the urine, nor was there sugar obtained after five drops of 1/1,000 solution of adrenalin. The blood count showed hemoglobin 60 per cent., 3.5 million r.b.c., and 6,000 w.b.c. The color index was normal, nor were any abnormal cells seen. The skin was always dry and the thyroid gland could not be felt. A Binet-Simon test showed that the intelligence was that of a child of seven years, but the arithmetical part was very poor. The child had been put on pituitary extract and had gained two pounds in eight weeks.

Dr. Walter Timme said that there was no doubt that the pituitary played some part in the syndrome, nevertheless he did not think it played the chief part. He felt that the condition was a polyglandular affair with secondary pituitary symptoms. The child showed a marked dysthyroidism with signs such as the long finger-nails, puffiness of the hands, pallor of the face, and subcutaneous infiltration. Behind these symptoms and behind the pituitary portion of the picture there could be seen something which could account for the low red blood cell count. It would be noticed that there was present

a brownish yellow coloration of the face and marked brownish pigmentation of the parts of the body subject to pressure, such as the line where the skirt band had compressed the body. This could be attributed to a suprarenal condition. The infantilism was evidently suprarenal in origin. In cases of suprarenal deficiency there were also seen secondary thyroid and pituitary characteristic changes, as shown in this case. Many cases were improved as far as general health, blood picture and metabolic picture were concerned, by very small doses of suprarenal gland and thyroid, and the pituitary could then be left to take care of itself, which sometimes it did, when there was no intense change in the blood picture. In cases where the actual stature was small, but there was no change in the proportions of the various parts to one another, nothing could be done to change the dwarfism. These cases were usually normal mentally and physically. This case evidently showed a polyglandular disturbance on a suprarenal basis.

Dr. Climenko in closing the discussion said that one did not know where to begin or end in the discussion of such cases. They presented a very fruitful field for the imagination, for discussion and for theorizing. One man would say that the pituitary was involved, another one would say with equal certainty that there was diminution of the thyroid, and another man would say something else, while others would agree with Dr. Timme that the condition was polyglandular. Lorraine had stated that the condition was due to infectious disease. Virchow had thought that the condition was hypoplasia of the entire vascular system. This child had gained in weight on pituitary extract.

A CASE OF CEREBELLAR TUMOR SHOWING OPERATIVE RESULT, AND ILLUSTRATED BY MOVING PICTURES

By Adrian Van S. Lambert, M.D.

The patient, a boy, 14 years, was admitted to the Presbyterian Hospital. For six months previous to admission he had complained of deafness in the right ear, and for two or three months he had had progressive difficulty in walking. For several months he had had poor vision in the left eye. For one month he found his speech was thick and had difficulty in making people understand him. He had had frequent headaches, beginning in the morning and lasting all day. There had been short periods of unconsciousness during which he had seated himself; there had been no falls or convulsions as far as he knew. On admission a diagnosis of cerebellar tumor in the right lobe was made, based on the following facts in his history and physical signs which he presented on examination: severe headache; attacks of possible petit mal; double choked disc; progressive disturbance in gait; right-sided ataxia; dysmetria; adiadochokinesis; right facial weakness; right internal strabismus and right-sided deafness. In addition he showed complete absence of caloric test on both sides, which was explained on the ground of torsion of both eighth nerves. The operation was as follows: A cross bow incision was made and the occipital bone was removed to the foramen magnum below curved line. The right hemisphere protruded more than the left. The right cerebellar pontine angle was exposed and showed normal condition. Incision into right cerebellar hemisphere demonstrated presence of tumor, which was enucleated by the finger following definite line of cleavage. The cavity bled profusely and was packed with gauze. Course: gauze out on third day p.o., out of bed eighteenth day p.o., shown on twenty-fourth day p.o.

Dr. Lambert showed motion pictures illustrating the symptoms of this case before operation. The pictures showed excursions in gait (migration to the right); the side-step (Schueller) test; the patient walking on his toes; difficulty in starting on the right leg; impossibility of maintaining bal-

ance when walking on heels; tendency to fall to right when blindfolded; the stair test (impossibility of descent without grasping rail); Fournier test (rising from sitting posture); turning to right and left; stopping at command (showing asynergia); and reflexes of lower extremities. In conclusion Dr. Lambert said that the patient was still very weak, twenty-four days post-operative, but he could walk and there was improvement in vision. The fundi were less choked than before.

Dr. Frederick Tilney said that the case had been an unusually interesting one because of the difficulty they had had in deciding upon the exact site of the lesion. They had been a long time in coming to a conclusion. As the history showed there were certain signs referable to the posterior fossa which were particularly confusing. The fact that the patient gave no response to the Bárány caloric tests on either side as well as the double deafness had to be explained by something else than a purely local lesion. There were also right-sided symptoms to be considered. When a conclusion was reached it was because the symptoms were thought to be characteristically cerebellar in type. The double deafness was attributed to the fact that the vestibular and cochlear eighth were under torsion but were not affected by direct pressure. From the preponderance of right-sided symptoms it was decided that the lesion was in the right half of the cerebellum.

Dr. I. Abrahamson said that he appreciated the magnificent demonstration of pictures by Dr. Lambert, but he felt that they illustrated a cerebellar tumor at the very end stage, and therefore not really a very characteristic picture. The staggering to one side was a vestibular symptom, and in this case both eighth nerves were affected, and there was also present the forced walking to one side and unsteadiness of the patient with tendency to the right. He felt that if Dr. Tilney would try to obtain pictures of congenital atrophy of the cerebellum it would be more conclusive teaching in regard to cerebellar disease than a tumor picture with distortion of the whole brain and tremendous hydrocephalus. The pictures themselves were excellent and both Drs. Tilney and Lambert were to be congratulated on this interesting method of presentation.

Dr. A. V. S. Lambert said that he had nothing to add in regard to the case. He would like to say a word about the motion pictures. There was an effort being made in New York to accumulate a large number of moving pictures for teaching purposes. A number of operative procedures by various surgeons had been recorded in this way for the purpose of demonstrating the technic. These films were to be sent to medical societies and schools in large centers of population, so that the films could be used for any particular kind of demonstration. It would be a very valuable thing also if clinicians would take up the work of putting on record some of the clinical features of disease which lent themselves to moving picture illustration. This company was under the control of doctors and it would appeal to many as a means which might easily be adopted of recording conditions for the use of those who were not so fortunately placed in large centers, and give them great educational advantages.

A CASE OF MILLARD-GUBLER SYNDROME

By Louis Casamajor, M.D.

The patient, a girl of 15 years, was the sixth of a family of ten children, five of whom had died of ordinary diseases. The others were healthy. At nine months old the patient had a facial palsy. Present illness began about March, 1915, with vomiting, headaches and stopping of periods for eight months. Weakness in legs was noticed and in arms also after scarlet fever (December, 1915), and trouble in hearing was noticed and attributed

to the latter. The voice had always been thick but a change was noticed after a "cold" in July, 1915. P, K, V, W, hard to sound; B was easily pronounced. Diplopia was noticed two months ago, dimness of vision a few weeks ago. Some dysesthesia was noticed in scalp and face. Physical examination showed a negative Wassermann. Reflexes showed Babinski on right; no clonus; some paresis of right hand and right leg; an ataxic tremor of left leg; superficial abdominal reflexes not elicited. The cranial nerves showed involvement of the fifth with hypesthesia of upper branch, left side; sixth paralysis of external rectus; seventh facial paralysis; eighth partial deafness. Pyramidal tract involvement showed hemiparesis on right with Babinski and there was also shown a cerebellar type of ataxia on the left side.

Dr. I. Abrahamson asked whether the caloric test was done to show whether the labyrinth was involved.

Dr. Casamajor said that the caloric test was not done. He said he had forgotten to mention that the rotation test was done and the Hitzig galvanic test. Neither labyrinth responded well, the right side more than the left. The cochlear branch of the eighth nerve was undoubtedly involved on the left side.

Dr. I. Abrahamson asked whether the abdominal reflexes were present.

Dr. Casamajor said they were absent on both sides.

Dr. Walter Timme asked how was the lack of taste in the anterior two thirds of the tongue accounted for on this theory. If the chorda tympani were involved the lesion would be peripheral rather than central. The nucleus of the fifth or of the ninth might account for that, but hardly the seventh. If the pyramid was affected to the extent stated by Dr. Casamajor, why was there not more spasticity shown on the right side and why was more clonus not shown? Why, if the lesion went so far, did not one also get some hemianesthesia due to pressure on the median fillet?

Dr. Neustaedter said that he had seen the patient twice recently. He found practically the same symptoms including a double choked disc. So far as he remembered there was a history of a peripheral facial paralysis antedating the present condition by about ten or twelve years which came on in the summer months and receded to the point of the present condition. This, it seemed, would account for the loss of the sense of taste in the anterior two thirds of the tongue. It was not at all improbable that the acoustic tubercle of the eighth was affected at the same time. He was of the opinion that there was a cerebellar neoplasm.

Dr. I. Abrahamson said he could not conceive of a tumor of the pons in that localization and causing choked discs, that would not at the same time affect the fillet. The history of remissions and exacerbations, the absence of the abdominal reflexes in a young girl, the tremor, the nystagmus, the speech disturbances, the light touch of the disease everywhere, indicated a multiple sclerosis rather than a pontine tumor. He had seen cases of multiple sclerosis with papillitis and he hoped that Dr. Schirmer would discuss that side of the question. Furthermore, choked disc was comparatively rare in pontine tumors, especially infiltrating ones.

Dr. Schirmer said that the typical optic nerve affection in multiple sclerosis was the retrobulbar neuritis. There were many cases on record, however, of papillitis and even of choked disc in multiple sclerosis.

Dr. F. Tilney said that this case was one of extreme interest and he had watched it carefully while it was being studied. He did not believe that the syndrome was a pure Millard-Gubler as originally described, since that was an alternating hemiplegia involving the sixth nerve. This case, however, belonged to the general group with additional symptoms which the original describers had not included. In regard to the pathology the diagnosis of neoplasm seemed to be far the most probable, although it must be admitted

that multiple sclerosis could not be altogether excluded. The possibility of choked discs from tumor in the pons, even if it were far forward, involving the tegmentum, was unlikely. The remainder of the symptoms could be seen with tumors in the brain. This was a more likely diagnosis than multiple sclerosis.

Dr. W. M. Leszynsky asked if the cerebrospinal fluid had been examined.

Dr. L. Casamajor said that Dr. Timme had mentioned taste. This was affected in the anterior two thirds of the tongue. This portion was supplied by the nerve of Wrisberg. The chorda tympani fibers did not arise from the fifth nerve. Cushing and others had shown that in removal of the Gasserian ganglion no loss of taste ever occurred. There was in this case an early attack of facial paralysis at nine months of age, which was almost completely recovered from, and nothing further was noticed until the difficulty in pronouncing labials two months ago. With regard to remissions in this case, there was nothing that could definitely be called a remission, it was rather gradual progress. The lack of involvement of the fillet was puzzling; there was a possibility of a lesion in the position without involvement of the fillet. It was not involved here. Multiple sclerosis could be excluded because the lesion was not multiple, it was a single one. The absence of choked discs in pontine tumor was well known and occurred in about 75 per cent. of the cases. Later in this disease there would probably be involvement of the fillet. There was no necessity to go to the length of assuming a multiple lesion when a single lesion would account for the symptoms.

Dr. I. Abrahamson asked if Dr. Casamajor would explain bilateral loss of abdominal reflexes as a single lesion.

Dr. Casamajor said he was not at all sure of the loss of abdominal reflexes. They were very hard to identify anyway, and he would not care to hang a diagnosis on this sign.

CYST OF THE FRONTAL LOBE OF THE BRAIN WITH INDIRECT POSTERIOR FOSSA SYMPTOMS

By F. Tilney, M.D.

Dr. Tilney said that localization of brain tumor was often confused by conflicting groups of symptoms. The major symptoms were due to increased intracranial pressure. The other group were specific symptoms due to focal pressure. Frequently the general symptoms included many signs which might readily be interpreted as focal. Thus it was better to class the symptoms as those due directly to the tumor pressing upon a certain locale, and those indirectly due to the neoplasm at a distance from it. The case presented illustrated the difficulty of determining which were the direct and which were the indirect symptoms. The patient, a girl of sixteen, had a negative previous history. She enjoyed good health, and menstruated regularly until four months before present illness. The family history was negative. Onset began in January, 1916, with grippe, after which she suffered severe headache localized in the right frontal region. These were at first remittent and later became constant. With this vision in the right eye grew progressively less, the left remaining unaffected. She became dizzy and on one occasion fell. Upon admission to hospital she complained of headache and blindness of one eye. She had several attacks of vomiting and examination showed double choked disc, 3-4 diopters in the right eye and 3 diopters in the left. Urine, blood and spinal fluid were negative and a diagnosis of brain tumor was made. There were mental changes, she was indifferent, apathetic and lacked initiative. Although suffering much her somatic reactions were apparently slight. She was somnolent, roused with difficulty and her attention was flighty. Neurological examination revealed no disturbance

in the somatic motor control of the body. She had a small area on the right side of the nose which tingled, otherwise there was no change in the somatic sensorium. Nerve involvement included: left-sided facial paralysis, very pronounced, due to involvement of the motor seventh; paralysis of left external rectus, giving internal strabismus, indicating involvement of the left abducens; paralysis of left pterygoid muscle and anterior belly of digastric. These were all posterior fossa symptoms, none being focally conclusive. Considered in detail these symptoms were criticized as follows: the left facial paralysis was purely motor, it was unaccompanied by disturbance in the chorda tympana, neither was the eighth nerve affected. (2) The involvement of the sixth nerve was considered due to indirect pressure. (3) The partial paralysis of the motor fifth seemed inconsistent with direct intracranial pressure on the trigeminal roots, for direct pressure would hardly pick out fibers to two muscles alone. The three symptoms were evidently not of the irritative type, but rather belonged to changes due to destruction. Direct pressure usually caused manifest irritation and these signs were absent. The symptoms were, as a whole, regarded as indirect symptoms without value in localization of the tumor. The other symptoms, viz., the pain over the right eye, the right frontal headache, the blindness in the right eye, and the greater elevation of the papilledema on the right side were then considered as a group and looked upon collectively as more conclusive on the localization of the lesion. Thus the symptoms usually held to be indirect were, in this case, considered as direct signs of the location and upon this was based the diagnosis of right frontal tumor. In the operation Dr. A. V. S. Lambert turned back a large flap over this region of the brain and found a cyst in the frontal lobe containing four to five ounces of fluid. This he drained by the method used by him at present. The patient made an uneventful recovery. The headache had almost entirely disappeared; the choked disc in the right eye had been reduced to two diopters, where formerly it was between three and four. The vision was no better, but the facial paralysis, the abducens paralysis and the trigeminal paralysis had disappeared, proving that these symptoms, usually considered as focal, were, in this case, indirect.

Dr. A. V. S. Lambert said that he had not much to add, except to say that the cyst contained three to four ounces of clear fluid which was removed by aspiration, and a drainage tube was put in to maintain permanent connection of the cyst with the subarachnoid space. Often failure occurred after the emptying of cysts and symptoms recurred later through reaccumulation of fluid. Removal of the cyst wall in this case was out of the question. It was exceedingly thin and was nothing but compressed connective tissue. There was no line of cleavage and the attempt to remove it would have caused fatal traumatism. A tube was put in of celloidin with a flange which formed a permanent drainage with the subarachnoid space. This substance was absolutely non-irritative and could be left in as an innocuous foreign body, preventing future reaccumulation of the cystic fluid.

Dr. H. Climenko said that sometime ago Dr. Goodhart and himself reported a group of brain tumors among which there was a frontal tumor. It gave symptoms very similar to those of Dr. Tilney's case and in addition his patient suffered from Jacksonian epilepsy. The patient came to autopsy and it was found that the entire medulla as well as the cerebellum were jammed into the foramen magnum. The cause of the distal symptoms of such a condition could easily be seen.

Dr. A. V. S. Lambert said that the pathological examination of the wall of the cyst was reported as consisting purely of connective tissue. There were no endothelial or epithelial lining cells and the report was consequently negative.

OPTIC NERVE AFFECTIONS AND THE DUCTLESS GLANDS

By Otto Schirmer, M.D.

The speaker dwelt upon the ophthalmological findings in the presence of endocrine diseases. Beginning with the hypophysis he stated that the heteronymous hemianopic types and the hemianopic pupillary reactions were consequences, not of disturbed internal secretion, but of the mechanical effect of the enlarged hypophysis. Only the complete temporal hemianopsia was suggestive of hypophyseal affection. Heteronymous defects of a quadrant or octant, or of the color sense alone, or heteronymous scotomata had the same diagnostic value. It was found also that injury to nerve fibers paralyzed first the fibers with the poorest function, *i. e.*, the peripheral fibers. The color sense was the higher function of the fiber and required more normal condition than the form sense. Thus there might be concentrical contraction of the color fields, while the white perception remained nearly normal. The nerve fiber was found to be very enduring against pressure, and before death of the fiber there occurred a state of paralysis lasting for variable length of time. If, during this time injury was removed, the nerve fiber would recover. This fact was of importance in prognosis of vision, as in cases of choked disc, where decompression was in question. Useful vision might return after a week or two of amblyopia. It was found that the difference in the configuration of the heteronymous defects was in strong contrast with the absolute identity found in homonymous scotomata. Even slight incongruities were rare in homonymous cases. In all cases of complete or nearly complete hemianopsia the hemianopic pupillary reaction was to be expected, but its demonstration was not always easy, owing to the refraction irregularities of the eye, and also to the fact that the majority of the centripetal pupillary fibers started from a small area round the macula, whereas the periphery was nearly void of them. In diagnosing tract-lesion, it was important to differentiate them from lesions behind the primary optic ganglia.

Pressure atrophy due to enlarged hypophysis might be found without evidences of hyper- or hyposecretion. This was often noticed in pregnancy, and was also seen with extirpation of the thyroid, with infectious disease or atrophy of the gonadal system. In cases of undoubted tumor of the hypophysis Oppenheim had found degenerative changes in the lumbar region of the cord, and had assumed that the same were due to disturbed hypophyseal secretion, thus if this possibility were admitted, one might also admit direct chemical influence on the optic fibers. Also in Graves' disease there was no doubt that excessive thyroid secretion affected the optic nerve. Such different conditions as atrophy and inflammation of the nerve might be produced. This was also seen in syphilis, where the toxin of the *Spirochæta pallida* was found to produce inflammation of the optic nerve in the second and third stages of syphilis, and atrophy in the so-called metasyphilitic stage. In parenthesis it should be said that just as the same disease might cause various affections of the optic nerve, so the same optic nerve affections might be produced by various diseases. The oculist could not diagnose the causative illness from the appearance of the optic disc. The help of the neurologist was needed to make accurate diagnosis. In conclusion the reader stated that in hypotheses and presumption lay progress of science. Experience and research would correct errors in these fields and there was not the slightest doubt that the study of the disturbances of endocrine equilibrium would help to diminish the number of optic nerve affections of unknown origin.

Dr. H. Climenko said that five years ago he presented before this society two cases of Leber's disease. He had made an extensive study of these, and, as far as he could remember, could not find any changes that would point to

a disturbed internal secretion. He would like to know whether Dr. Schirmer would explain that disease on the basis of internal secretions.

Dr. Kaplan said that Dr. Schirmer had mentioned the extensive communication of Oppenheim who proved that syphilitics could be greatly improved by pituitary extract. It had long been accepted that the pituitary played an important rôle in tabes and general paresis, and in the predisposition to syphilis in general, and that the ability to contract syphilis depended upon the constitution, and especially upon the endocrinal constitution of the individual. An interesting and suggestive article had been written by R. Stein in which he dwelt upon the constitutional landmarks that would show when the syphilitic individual would get tabes, and when he would get paresis. This diagnosis was based upon a study of the endocrinal functions and also suggested the idea that the treatment of these patients (after they had got syphilis) with pituitary extract would relieve the condition and perhaps save the patient from looking to modern metallic preparations for relief.

Dr. W. M. Leszynsky said that Dr. Schirmer had brought out very important suggestions from the ophthalmological as well as the neurological aspect of the subject, not only in regard to optic nerve symptoms produced by disturbance of the internal secretions, but also as to the mechanical involvement of the optic nerve in hypophyseal disease. One interesting point (emphasized by Dr. Schirmer) was that the color fields were lost before the white fields in hypophyseal pressure upon the optic chiasm. Several years ago Dr. Leszynsky had presented several patients with akromegaly before the ophthalmological section of the academy. One showed bitemporal hemiachromatopsia without involvement of the fields for white. If these facts were always borne in mind, it would avoid the error in pronouncing fields as normal that showed normal white fields, whereas, if the color fields were tested first, the result might indicate early pressure upon the optic nerve fasciculi. He had been able to demonstrate this in many instances.

Dr. Schirmer said that he was an assistant of Leber at the time of the work mentioned by Dr. Climenko, but at that time no one knew anything about endocrine diseases. In later work more cases of the same type had been seen, but it was not known that there was any connection with the endocrine glands. As far as multiple sclerosis went, he was not able to say anything in that direction. It was well known, however, that as soon as new ideas became popular, there was an inclination to overestimate their importance and to view everything from the new standpoint. Some connections might thus be found, but it was necessary to modify the viewpoint considerably. These remarks applied to the subject of tabes and the pituitary gland. He had never seen a case of tabes with optic atrophy where he had felt inclined to attribute the trouble to disturbance of the endocrine glands. It was possible that he might change his mind, but so far he had not done so. The cases mentioned by Oppenheim were not cases of tabes at all. They were hypophyseal tumors. As to color hemianopsia—this sometimes preceded hemianopsia of the white field for a long while for the reason that color perception was a higher function than the white perception. The white might remain normal after the color was lost entirely. This was of as great diagnostic value as hemianopsia of the form field.

Translations

VEGETATIVE NEUROLOGY, THE ANATOMY, PHYSIOLOGY, PIARMODYNAMICS AND PATHOLOGY OF THE SYMPATHETIC AND AUTONOMIC SYSTEM

BY HEINRICH HIGIER

WARSAW

Authorized Translation by Walter Max Kraus, A.M., M.D.
[New York].

(Continued from page 270)

I. Iodothyrene, or iodothyreoglobulin, the hormone which is gotten from the secretion of the thyroid gland, or from the thyroid gland itself, causes, when continually produced, a chronic condition of stimulation in the sympathetic (tachycardia, widening of the lid slits, exophthalmos, emaciation, sweating and increased sensitiveness of the eye to adrenalin). Its action is selective, in that it excites, or makes more excitable, only the cervical and thoracic sympathetics.

II. Hypophysin, pituitrin, or pituglandol, the active principle of the infundibulum hypophysi contracts all arteries (rise in blood pressure) with the exception of the renal vessels which are dilated (diuresis) and stimulates the lumbar sympathetics, especially the nerves to the bladder and uterus (action of stopping hemorrhage and stimulating labor pains). In larger doses it has some influence upon the autonomic system.

III. Adrenalin, or suprarenin, a methyl amino derivative of pyrocatechol which, unlike cholin, is *not* found in the cortex, but in the medulla of the adrenals, may be considered as the most important representative of that group of hormones which act upon peripheral nerve endings. It acts even though the connecting nerves, from the central nervous system, be divided. Since the entire action of adrenalin is present, even after the preganglionic and postganglionic fibers have been divided for months or years, the

place of its action, as has been said before, is at that part of the nerve which does not degenerate after section of the nerve, that is the myoneural junction (Elliot).

Adrenalin, which may also be found in a slightly modified form in the aortic, carotid and coccygeal paraganglia, is by no means, as is sometimes falsely stated, a stimulant of smooth muscle. It stimulates the entire sympathetic, and produces in its accelerator nerves acceleration or increase in the functional activity of the organs which they supply, while in its inhibitory nerves, it produces inhibition or decrease of function.

The manifestations of its actions are as follows: Tachycardia, increase of cardiac action, increase of blood pressure through vasoconstriction, mydriasis and exophthalmos, depression and an anemic state in the respiratory and gastrointestinal tract, increase in sphincter tonus, and decrease of the secretions of various glands. It also affects carbohydrate metabolism, in that it has a mobilizing action upon the carbohydrate storehouses, the liver and muscles, which causes glycogen to be broken down, and increases the burning of sugar.¹ It also, by peripheral stimulation of the sympathetic, produces a transient glycosuria, in the same way as the central stimulation of the Claude Bernard "Piquêre."

The antagonistic action between the sympathicotropic adrenalin, and the vagotropic pilocarpin, both of which stimulate the accelerator nerves peripherally, is made clear by the facts that adrenalin abolishes pilocarpin eosinophilia, and that pilocarpin abolishes adrenalin glycosuria. The antagonistic action between adrenalin and cholin, both hormones of the adrenals, is less outspoken.

Of the internal secretions, that of the pancreas is the most sensitive to adrenalin. The production of adrenalin is normally inhibited by the pancreas, and is enormously increased after its extirpation. In congenital or inherited deficiency of the chromaffin system (Addison's disease) the actions of the autonomic system are in the foreground.

The following interesting facts are to be noted in regard to a peculiar antagonism in the influences which regulate the blood picture.

All sympathicotonic substances, by virtue of an intense stimulation of the bone marrow, produce a long-lasting neutrophil hyperleucocytosis, with an eosinophilia, while, on the other hand, all vagotonic substances produce a transitory retention of neutrophil cells

¹ *Tr. Note.*—Lusk has recently contended, on the basis of his experiments, that this is not so, and that carbohydrate and nitrogen metabolism are unchanged by injection of adrenalin.

in the internal organs, an absolute increase in the mononuclear cells, *i. e.*, lymphocytosis, and an outspoken hypereosinophilia.

The following facts will show how exactly alike are stimulation by adrenalin, and stimulation of sympathetic nerves.

I. Adrenalin stimulates all sympathetic fibers to blood vessels (vasoconstrictors) and produces a general narrowing in blood vessels, and an increase in blood pressure. The coronary arteries are the exception in having only vasodilators, and here a teleologically significant local dilation of the blood vessels results. Finally, adrenalin has no effect upon the blood vessels of the lungs, since they have no sympathetic innervation.

II. Many organs, as the bladder and uterus, which in different species of animals, dogs, cats and rabbits, are variously influenced by the sympathetic system, are also variously influenced by adrenalin. When stimulation of the nerves accelerates, adrenalin does also, whereas if the action be inhibitory that of adrenalin is the same.

The following observations may be drawn from our knowledge of the action of adrenalin. First: with the exception of glycosuria, all its actions are obtained more rapidly by intravenous than by subcutaneous injections, and, second: the action of repeated injections is lasting, whereas a single injection produces but transitory effects, though the blood still contains adrenalin and has the power of raising blood pressure when injected into other animals.

Whether the great depression of blood pressure, the rapid decrease of blood sugar and death resultant upon extirpation of the adrenals are due to some unknown auto-intoxication, or to a lack of adrenalin, has not as yet been decided. This is especially true when one considers that besides adrenalin (Wessely) the adrenals excrete the antagonistically acting cholin (Lohmann), as well as other hormones of physiological significance.

There is, beside the physiologically produced adrenalin, a synthetic adrenalin of identical biological and chemical characteristics. This is composed of levorotary, and dextrorotary components, and is optically inactive. It is not toxic, does not increase blood pressure, and diminishes the blood-raising power of adrenalin.

Before ending our consideration of the pharmacology of the vegetative system, and proceeding to the sections on general pathology, and clinical aspects, a word must be said about the experimental production of a state of increased reactivity in the organs supplied by the vegetative system. This condition may be obtained as well by isolation of the organs from the central nervous system as by the poisons above mentioned.

The phenomena, resultant upon isolation of the organs, may be demonstrated by extirpation of the sympathetic ganglia, with subsequent degeneration of the post-cellular fibers. In this experiment, the reactivity is very much increased. A minimal dose of adrenalin, which ordinarily would produce little or no effect, will cause, when injected intravenously or subcutaneously, a mydriasis and anemia of the ear of the operated side.

Among the drugs which raise the threshold of irritability, physostigmin has already been mentioned. This increases the irritability of the autonomic system. Cocaine has the same effect for the sympathetic. It so increases the irritability of the nerve endings in organs that a normally inactive dose of adrenalin will produce a marked and lasting reaction.

This increased irritability, when noted in the pupil, is designated as Loewi's reaction. It does not appear to be a general reaction, but occurs only in certain organs.

The explanation of this phenomenon is by no means clear. It may be a removal of inhibitory influences. Probably, it is due to the absence of centrifugal impulses from sympathetic end-organs, which aid in maintaining a certain level of tone in them. After the use of cocaine or section of afferent and efferent nerves, the normal inhibitory influences which diminish organ irritability are absent. Analogous phenomena occur in the case of the retina in absolute darkness and in the case of the labyrinth in absolute silence. This peculiar action of cocaine is of practical value, since, in cases where the results of large injections of physiological adrenalin or the less toxic synthetic adrenalin are to be feared, a dose of cocaine may be given which will increase the action of the adrenalin.

At the close of this consideration of the pharmacology of the vegetative system, we have placed a table which contains a résumé of the actions of the better known substances which influence the autonomic and sympathetic systems. This table has been compiled from the works of Eppinger and Hess, A. Biedl, Fröhlich, and Loewi.

X. GENERAL PATHOLOGY OF THE VEGETATIVE SYSTEM

During the last few years the Vienna school have attempted to show that the idea of sympathicotonia and vagotonia is not only applicable in experimental physiology and pharmacology, but that it may be applied in the clinic as well. Observation teaches us that the phenomena which may be demonstrated in experimental work are the same as those which appear as symptoms and symptom

Action of Stimulation of the Sympathetic System	Action of		Organ	Action of		Action of Stimulation of the Autonomic System
	Atropin	Adrenalin		Pilocarpin	Ergotoxin	
Stim. (Th. I-II)	Para.	Stim.	Sphincter iridis	Stim.	—	Stim. (N. III)
Stim. (Th. I-III)	Para.	—	Dilator iridis	—	—	—
—	—	Stim.	Ciliary muscle	Stim.	—	Stim. (N. III)
Stim. (Th. II-IV)	Para.	(Stim. ?)	Orbital muscle	Para.	Para.	—
—	—	Constriction	Salivary glands	Stim.	—	Ch. tympani. secretion
Constrict. (Th. II-IV)	Constrict. ?	Dilatation	Cortical blood vessels	—	—	Dilatat. (N. X)
Constrict. (Th. II-L, IV)	Dilatation	Constriction	Buccal blood vessels	—	—	Constrict. (N. IX)
Constrict. (L, I-IV)	—	Constriction	Skin blood vessels, head region	Constrict.	—	—
Stim. (Th. II-L, IV)	—	Constriction	Coronary blood vessels	—	—	—
Stim. (Th. IV-VII)	Inhib.	Inhib.	Intestinal blood vessels	—	Dilatat.	—
Stim. (Th. I-V)	Stim.	Stim.	Genital blood vessels	—	—	—
Relax. (Th. II-V)	Relax.	Relax.	Sweat glands	Stim.	—	Dilatat. (N. pelv.)
Para. (Th. II-L, IV)	Para.	Para.	Pilomotor muscles of the face	—	Para.	—
Diminished (Th. II-L, IV)	Diminished	—	Heart muscle	Inhib.	Inhib.	Inhib. (N. X)
Para. (Th. II-L, IV)	Para.	Para.	Esophagus	Stim.	—	Stim. (N. X)
Diminished ?	Diminished	Diminished ?	Cardia	Stim.	—	Stim. (N. X)
Inhibition (Th. II-L, IV)	Para.	Para.	Gastric tone	Increase	—	Increase (N. X)
Relax. (L, I-IV)	Relax.	Relax.	Gastric peristalsis	Increase	—	Increase (N. X)
Relax. (L, I-IV)	Relax.	Relax.	Gastric secretion	Increase	—	Increase (N. X)
Relax. (Th. II-L, IV)	Relax.	Relax.	Small intestine peristalsis	Stim.	—	Stim. (N. X)
Inhib. ?	Inhib.	Inhib.	Colon	Stim.	—	Stim. (N. X)
—	—	—	Sphincter ani (muscle)	Spasm	—	Stim. (N. pelvicius)
Contract. (L, I-IV)	—	Contract.	Gall-bladder	Contract.	—	Spasm (N. pelvicius)
Relax. (L, I-IV)	—	Relax.	Pancreatic secretion	Stim.	—	Contract. (N. X)
—	—	—	Bronchial muscle	Stim.	—	Stim. (N. X)
Contract. (L, I-IV)	—	Contract.	Sphincter vesicae	—	—	Stim. (N. X)
Relax. (L, I-IV)	—	Relax.	Detrusor vesicae	—	—	Relax. (N. pelv.)
—	—	—	Uterus (Preg.)	Relax.	—	Contract. (N. pelv.)
—	—	—	Uterus (Non-preg.)	Contract.	—	—
Contract. (L, I-IV)	—	Contract.	M. retractor penis	—	—	—
Piqre	—	Raised	Carbohydrate tolerance	Diminished	—	Relax. (N. pelv.)
Heat puncture	—	Raised	Heat balance	—	—	—
Contract.	—	Contract.	Pigment cells	Dilatat.	—	—

Stim. = stimulation. Constrict. = constriction. Relax. = relaxation. Para. = paralysis. Inhib. = inhibition.

complexes at the sick bed. One must, however, in addition to such observations attempt to make clear what metabolic changes are taking place in the body, and where, in a given case, the body toxic poisons are acting, or to put it more generally, we must, in addition to noting symptoms and symptom complexes, attempt to find the etiology.

Physiology teaches us that after the nerves to many smooth muscles are cut, the tonus of these muscles returns in a short time. From this we may deduce that the muscles have intrinsic nervous organs which maintain their tone, and that the sympathetic and vagus act only as inhibitory or stimulatory influences upon the ganglion residing in the muscle.

That the fibers of the vagi are in a state of continuous tonus, is best shown by the fact that bilateral bisection of these nerves causes a permanent acceleration of the heart beat.

As to the tonus of the sympathetic nerves to those organs, cutting the peripheral sympathetic gives, among other phenomena, narrowing of the pupil, exophthalmus, and a dilatation of the blood vessels softening the glands and the skin of the face.

Aside from the data derived from the last named nerves, we know that the endogenous sympathicotrophic hormone, adrenalin, which stimulates the sympathetic system, is continually being formed by the chromaffin cells of the body and that in this way the tonus of the sympathetic system is, in all probability, kept permanent.

Less constant is the action of the products of the thyroid and infundibulum of the hypophysis, two of the group of glands which stimulate the sympathetic, and the action of the parathyroids, pancreas and ovaries, which are of the sympathetic inhibiting group. Whether or not the body produces a vagotropic hormone action, as pilocarpin, is not known. Most of the vagotropic products (cholin) are produced in small amounts and are known to have an elective action upon the autonomic system. One fact, clinically verified by a large number of cases, is certain; that individuals whose reaction to adrenalin is increased beyond the normal, show underactivity towards pilocarpin.²

One may, therefore, state that a given individual is of a vago-tonic constitution when, together with functionally increased tonus of the vagal system, there exists an increased reactivity to vago-tonic substances (pilocarpin). There are individuals in whom the manifestations of activity of the sympathetic system predominate.

² *Tr. Note.*—This is not always the case.

These react more strongly than the normal to adrenalin. And on the other hand there are those in whom the manifestations of activity of the autonomic system predominate. These react much more strongly than the normal to pilocarpin. Following this idea, the functional activity of the vegetative system is tested by drugs acting either upon the autonomic or sympathetic system. Resultant upon our knowledge of pharmacodynamic antagonism, a method has been devised by which to make clear the clinical picture of the supposedly frequent condition of vagotonia.

How does the symptom-complex of vagotonia manifest itself clinically? The physiological signs of stimulation of the autonomic system have been described in detail above, and all of these are reproduced in the clinic: Narrow pupil and spasm of accommodation (stimulation of the sphincter and of the ciliary muscle of the pupil), widening of the lid slits (stimulation of the levator palpebrae), salivation and epiphora (stimulation of the chorda tympani and of the lacrimal nerve), hyperidrosis (stimulation of the sweat nerves), reddening of the face and mild cyanosis of the sweating extremities (stimulation of the vasodilators), strong pulsation of the heart, bradycardia, pulsus irregulatorius respiratorius, disturbance of the propagation of the cardiac impulse, phrenodynia, temporary cessation of breathing (stimulation of the branches of the vagus going to the heart and lungs), bronchial asthma (stimulation of the smooth musculature of the bronchi), eosinophilia, hyperacidity, increased gastric peristalsis, transitory spastic conditions in the esophagus, cardiac and pyloric musculature, tonic contracture of the intestine, spasm of the musculature of the gall bladder and of the pancreatic duct (stimulation of the abdominal vagus), spasm of the circular muscles of the colon, of the sphincter anus muscle, of the detrusor muscle of the bladder, and of the vasodilator muscles of the bladder and genitals (stimulation of the pelvic nerve). All of these phenomena are said to disappear after large doses of atropin and to increase after pilocarpin.

Eppinger and Hess include among the vagotonic neuroses of the heart: Vasomotor angina pectoris (stimulation of the vasoconstrictors of the coronary vessels) Hertz's bradycardias hypotonus and the phrenocardia of sexual origin.

B. Vagotonia regarded as a functional disease of the autonomic system may, according to the above mentioned authors, present itself as a malady which may be general or local, individual or familial, permanent or periodic, pure or combined, adult or juvenile, outspoken or abortive, manifest or latent.

Local vagotonia is the functional increase in tonus which results from toxic substances, circulating in the organism, which have a selective action upon definite autonomic nerves (the nerve to sphincter muscle of the pupil, the vagus nerve or the pelvic nerve). Periodic vagotonia manifests itself particularly as local cardiospasm or esophageal spasm, or as a functional heart disease. Combined vagotonia shows the pure symptom-complex plus such conditions as enteroptosis, cor mobile, pendant heart, costa fluctuations, persistent thymus, lymphatism, status thymico lymphaticus (Paltauf), eunuchoidism (Tandler-Gross). Mongoloid degeneration, asthmatic constitution (Stiller), hypoplastic and other constitution anomalies which, as vagotonia itself, are regarded as evidence of inferiority and degeneration.

The question now arises, how may one establish a diagnosis of vagotonia, or of a vagotonic disposition? We understand the clinical picture of vagotonia to be a permanent, tonic over-activity in the autonomic system, by virtue of which the organs supplied by it are in a condition which closely corresponds to that which would be produced by stimulation of the autonomic system. This condition must be considered as the basis of the vagotonic disposition, *i. e.*, "an abnormal reactivity of the entire or of only a definite part of the autonomic nerves, which under the influence of an adequate stimulus will lead, even if this stimulus be of less intensity than one to which the normal nervous system would react, to the syndrome of vagotonia" (Eppinger and Hess).

Vagotonia occurs chiefly in youthful or middle-aged individuals who are particularly subject to autonomic traumata, and who show, either permanently or transiently, one or more of the manifestations described above.

When vagotonia is suspected, a subcutaneous injection of pilocarpin will reveal the existence of vagotonic symptoms which may give rise to no complaints on the part of the patient, or may metamorphose serious latent pathological disturbances into manifestly acute conditions, such as tabetic crises, bronchial asthma, bradycardia, or angina pectoris vasomotorius.

In other cases, the appearance of a suspected symptom in some branch of the autonomic system (as a crisis or salivation, for example) may be accompanied by more symptoms, as for example miosis, epiphora or goose flesh, which are readily recognizable and are to be regarded as manifestations of over-activity in other branches of the same system.

Atropin and often adrenalin affect the symptoms and signs of

over-activity of the autonomic system favorably, pilocarpin unfavorably. To bring this out, the optimum dose in man, subcutaneously administered, is

Atropin	1 mg. (gr. 1/70)
Pilocarpin	1 cg. (gr. 1/7)
Adrenalin	1 c.c. (℥ xv)

In advanced age, the reactivity decreases and vagotonia gets better, or may even disappear.

C. How are we to understand the genesis of vagotonia? Most probably, some product of internal secretion is the cause of the increased tone in the autonomic system. It is known that of the endocrinous products, of which more was said in detail above, adrenalin is an intense general stimulant of the sympathetic system, while thyroidin and infundibulin impart some vagotropic and some sympathicotropic impulses, while the secretion of the pancreas, and cholin derived from the cortex of the adrenals are purely vagotonic. The two last mentioned do not influence the entire autonomic system, but have a selective action. The internal secretion of the pancreas acts principally upon metabolism, while cholin acts chiefly upon blood pressure and the pupil. If one considers further what large amounts of the last mentioned substances would be necessary to maintain a permanent tonus in the whole system, it would seem, quite contrary to the case of adrenalin, very improbable that these bodies play the physiological rôle of the sought-for "automin" or "autonomic vagotonin."

Eppinger and Hess are of the opinion that vagotonia, like status lymphaticus and thymicus with which it is so often combined, is a partial manifestation of an inferior organism. Just as other organs and systems may be backward in their development, so also the chromaffin system may be poorly developed, and thus less of the sympathicotonic adrenalin is produced, so that its antagonists may give more stimulation than when the activity of the medulla of the adrenals is normal.

Besides this congenital insufficiency and inferiority of the internal secretion in the realm of the chromaffin system, the Vienna School maintained the possibility of another condition which would be the basis of a so-called inherited constitution.

On the evidence of the parallelism, both clinical and at autopsy, between vagotonia and status thymicolymphaticus, they maintain that vagotonia may be the clinical manifestation of the anatomically demonstrable lymphatic constitution, and of the functional overproduction of the internal secretion of the lymphatic system. This

is quite in accord with the fact that vagotonia appears mainly in youth, in which the lymphatic constitution is generally found. Furthermore, lymphatism and persistent thymus not infrequently coëxist with defects in the adrenals in which the chromaffin substance is lost.

In regard to the bearing of many physiological and pathological conditions upon vagotonia, the following may, according to the above-mentioned authors, be mentioned in addition to what has already been stated.

The climacteric, with its well-known vasomotor, secretory and metabolic changes (obesity) is an inherited vagotonic condition, which results from the removal of a sympathicotonic internal secretion. It is not out of the question that, in men also, the removal of a sympathicotonic internal secretion of the male genital organs (Mendel) may aid in giving autonomic stimuli in the climacteric age.

The clinical picture of Graves' disease and of myxedema is so fundamentally varied and contradictory that the thyroid product, according to the individual tendency of the patient, may stimulate the autonomic system (widened eye slits, von Graefe's sign, tachycardia, sweating, salivation, diarrhea and eosinophilia), or may stimulate the sympathetic system. In individuals without any outspoken tendency, the thyroid product produces symptoms in both systems, quite differently than in pure vagotonic or sympathicotonic individuals. In the present state of the matter, it is difficult to make a definite decision in regard to the peculiar experience, confirmed by Noorden, that pure Graves' disease is rarely, while mixed Graves' disease is always associated with psychopathological conditions.

(To be continued)

Periscope

Archiv für Psychiatrie und Nervenkrankheiten

(53. Band, 2. Heft)

- XIII. Rarer Varieties of Acute Non-suppurative Encephalitis. GEORG HENNING.
- XIV. Contribution to the Clinical Course and Pathologic Anatomy of Multiple Sclerosis, with Special Reference to Its Pathogenesis. E. SIEMERLING and J. RAECKE.
- XV. Concerning the Influence of the "Constellation" on the Sensory Reaction of Choice and on the Results of the "Konstanz" Method. HEINRICH BICKEL.
- XVI. Whence Comes Our Knowledge of Self? How Are We Conscious of Ourselves? ANT. HEVEROCH.
- XVII. Eunuchoidism. KURT GOLDSTEIN.
- XVIII. The Psychiatric and Nerve Clinic at Königsberg. E. MEYER.
- XIX. Contribution to the Forensic Psychiatric Significance of Menstruation, Pregnancy, and Birth. (Continued article.) HANS KÖNIG.
- XIII. *Encephalitis*.—Henning, in this article, discusses clinically a series of cases in which the symptoms of encephalitis occurred without accompanying suppuration. Beginning with Wernicke's first description of acute non-suppurative encephalitis, Wernicke's acute hemorrhagic polioencephalitis, and Strümpell's encephalitis as a cause of the cerebral paralysis in children, followed later by a description of the encephalitis occurring in connection with influenza, a group of conditions of widely varying symptomatology and etiology have been described. With the relation of these conditions with myelitis and poliomyelitis with the serous meningitis of Quincke, and still later with various forms of mental disturbance presumably on an encephalitic basis, the field of this type of disturbance has been still more widened. Finally, there is some justification for the term "syphilitic encephalitis." Henning attempts to describe under certain definite groupings a variety of clinical forms which correspond in greater or less degree to this broad conception of encephalitis. The paper is concerned largely with the reports which have appeared in the literature, and with an attempt to throw some light into the dark places of this somewhat protean affection.
- XIV. *Multiple Sclerosis*.—Siemerling offers an admirable résumé of our knowledge of multiple sclerosis, supported by a bibliography of 441 references. With generous reference to other writers, he discusses theories of etiology, the pathological anatomy, and the symptomatology in exhaustive fashion, together with the report of a series of cases observed by himself. In general, he concludes that, although the matter is as yet far from being definitely settled, it is evident, both from the histological picture and from the clinical course of the disease, varied as it is, that by all means the most probable etiology is an infection. Although this hypothesis is by no means new, the writer adduces evidence which will go far toward establishing it as the most workable theory. He urges a still more careful study of the disease on this basis, and calls attention to the desirability of investigating the past

history of persons suffering from multiple sclerosis with reference to previous recognized infectious diseases. The question of latent infection appearing at a long interval after the original disease is considered a definite possibility.

XV. *Konstanz Method*.—This article is too technical to permit of review in small compass.

XVI. *Self-consciousness*.—Heveroch offers a critical physiological study of the nature of consciousness of self in relation to various phenomena occurring both in health and in disease.

XVII. *Eunuchoidism*.—Goldstein believes that there is a clinical picture based upon a congenital hypo- or dys-plasia of the glandular apparatus associated with internal secretion, which manifests itself through various symptoms, depending upon the degree with which one or another of the various glands is affected, but which nevertheless has a common basis. For example, there may be eunuchoid overgrowth, eunuchoid adiposity, or a combination of both, or overgrowth with an absence of fat, or with myxedematous features, etc. The hypoplasia of the glands goes hand in hand with a hypoplasia of the brain. The disease manifests a distinct familial character. One may characterize it as a familial disturbance of development of the glands concerned with internal secretion and of the brain.

XVIII. *Königsberg Clinic*.—Meyer describes the psychiatric and nerve clinic at Königsberg, with illustrations of buildings and of methods used in the study and treatment of patients.

XIX. *Menstruation*.—Continued article.

(53. Band, 3. Heft)

XXII. A Contribution to the Forensic-psychiatric Significance of Menstruation, Pregnancy, and Birth. (Conclusion.) HANS KÖNIG.

XXIII. Concerning Primary and Metastatic Melanosarcoma of the Central Nervous System. MARTIN LÜA.

XXIV. Abortion in the Psychoses from the Psychiatric, Legal, and Moral Standpoint. ARNOLD LIENAU.

XXV. Morphism and Commitment. OTTO REMERTZ.

XXVI. The Condition of the Central and Peripheral Nervous System in Various Poisonings and Disturbances of Nutrition. J. SHIMAZONO.

XXVII. Brain Weight in Mental Disease. PAUL KIRCHBERG.

XXVIII. Funicular Myelitis with Bulbar and Polyneuritic Symptoms. HEINRICH BICKEL.

XXIX. Mental Disturbances in Ergotism. G. A. KOLOSSOW.

XXX. Vestibular Head Nystagmus and Facial Nystagmus in Pseudo-bulboparalysis. M. ROSENFELD.

XXII. *Criminality and Generative Function*.—König points out the fact widely accepted that criminality is very much more prevalent among men than among women. The proportion, for example, as demonstrated by Lombroso, for Prussians being 17 to 3, a proportion generally recognized. Among women the relationship of unsocial acts to menstruation, pregnancy, and birth is considered at length, with numerous illustrative cases, in connection with their forensic bearings. Among the many conclusions drawn from this study the following are worthy of special mention: The possibility of a criminal act occurring during the period of pregnancy always demands consideration. Pregnancy may bring to the surface a tendency to disease already present leading to criminal acts. It may also form the groundwork of such acts without such preëxisting tendency through various influences of an exogenous character. How far pregnancy must be held responsible for criminal acts may only be determined in individual cases by a medical examination.

Further conclusions are that the mental state of childbearing women is to be regarded as a departure from the normal, and that a criminal act—as, for example, the killing of the child—on purely psychological grounds should be given a special judgment and a special punishment; and again, that no distinction in these respects should be made between married and unmarried women. In more detail, the forms of mental disturbance which may occur at this period are fainting, states of excitement, and confusion in persons with little or no psychopathic tendency. In persons of hysterical disposition, attacks of drowsiness or stupor or twilight states may occur. Similar twilight states occur in persons of epileptic tendency, together with pre- or post-paroxysmal states of confusion. In eclamptic conditions twilight states may also occur. In close relationship with the birth-act stand the deliriums of fever and the outbreak of psychoses of various sorts, either on the basis of those already existing or first appearing at that time.

XXIII. *Melanosarcoma*.—Lusa discusses the somewhat unusual and very malignant melanosarcoma of the central nervous system, both as occurring primarily and by metastasis. To this study, in which he discusses the existent literature on the subject, he adds a case of his own, with a detailed report of the autopsy findings. Of interest in the case was the fact that microscopic examination showed that the entire pia of the brain and cord was infiltrated with the tumor as well as various parts of the underlying nerve substance. The tumor originated from a primary focus in the face, thence by metastasis spreading throughout the central nervous system. The part played by the vascular system is considered.

XXIV. *Abortion and Psychosis*.—The question of the production of abortion in women suffering from certain psychoses leads Lienau to the following general conclusions: (1) That there are no legal or moral reasons why such abortion should not be brought about in certain cases. (2) That it is definitely indicated in all cases in which the continuance of pregnancy is likely seriously and permanently to endanger the mentality of the mother, and in which the physicians believe that a termination of pregnancy will remove this danger. (3) That the position that an artificial abortion should not be done in cases of true mental disease is not tenable; especially in such cases should it be undertaken more often than heretofore. (4) That in the severe depressions of psychopathic persons treatment in institutions should be adopted in preference to artificial abortion.

XXV. *Morphinism*.—Remertz discusses the laws relating to the detention or confinement of persons addicted to the use of morphine. The paper is a technical description of relatively small importance in English-speaking countries of the regulations existent in Germany. The question, however, of the treatment of morphine habitués is of considerable general interest.

XXVI. *Poisoning and Nervous System*.—In his study of the conditions occurring in the nervous system through various forms of poisoning and disturbances of nutrition, Shimazono reaches the following conclusions: The diffuse increase of Elzholz bodies and the occurrence of segmenting processes, as well as the deposition of lipid substances in the elements of the nervous system, all indicate the general disturbances which occur as the result of poisonings and disturbances of nutrition. Other conditions are likewise observed exclusively or principally in the central nervous system, such as localized changes, in the form of small hemorrhages with following neurolytic swelling of the nerve fibers, or with granular degeneration of the ganglion cells; or, as in lead, with circumscribed inflammatory foci. The significance of granular degenerations of the axis-cylinders and the circumscribed breaking down of the axis-cylinders remains undetermined.

XXVII. *Brain Weight and Psychoses*.—Kirchberg adds to the knowledge of brain weights in mental disturbances. At the beginning of the article he

gives an interesting series of figures regarding the weights of normal brains as compared with those of diseased persons as determined by other investigators. His own studies cover the conditions of paralytica dementia, arterio-sclerosis, and senile dementia, or psychoses with gross changes; and alcoholic psychoses, catatonia, epilepsy, tubercular meningitis, as types of psychoses with fine anatomical changes. His conclusions, graphically represented by charts, are summarized at the end of the article. When a sufficient number of such statistics are gathered, they should prove of considerable value, allowance always being made for the wide normal variation in brain weight. A matter of importance also described in the article is the relative difference between the skull capacity and the brain weight, naturally a better criterion than the brain weight alone.

XXVIII. *Funiculitis*.—Bickel, on the basis of a case, emphasizes the difficulty of distinguishing in certain cases between combined systemic disease and funicular myelitis. The case in brief was a symptom-complex which developed after a feverish intestinal attack pointing toward a degeneration of the dorsal and lateral tracts. To this was added bulbar and polyneuritic symptoms, a retrobulbar neuritis and a bilateral paralysis of the musculo-spiral nerve. There was also a moderate degree of mental enfeeblement. Post mortem very definite implication of the blood vessels was found. In general, the appearances were such as to justify the term funicular myelitis, supposedly proceeding from the blood vessels. The discussion is an addition to our classification of this type of central nerve lesion.

XXIX. *Ergotism*.—Kolossow finds that mental disturbance is a common accompaniment of ergotism; that it may occur in patients without pathological heredity; that young persons are particularly predisposed; that the mental disturbance may show itself in the first weeks of the illness; that the type of mental disturbance depends upon the degree of poisoning and the personal idiosyncrasy of the patient; that certain severe types of mental disturbance, as, for example, associated with epileptic attacks, may occur with bad prognosis, but the variety of forms in which the mental disturbance may manifest itself precludes the possibility of speaking of a distinct ergotin psychosis; that the mental disturbance is often transient; that in the majority of cases it is accompanied by objective signs in the nervous system.

XXX. *Vestibular Nystagmus*.—Rosenfeld briefly reports a case in which as a result of numerous bilateral areas of softening in the cerebrum and particularly in the central ganglia, which are assumed to exist, the matter of vestibular nystagmus was investigated. It was found, in addition to very well defined vestibular eye nystagmus, that there was also a head nystagmus of very definite intensity, and in addition rhythmic twitchings in a branch of one facial nerve synchronous with the eye nystagmus and head nystagmus which he feels justified in terming a facial nystagmus. He draws attention to the fact that vestibular nystagmus is characteristic of supranuclear lesions, and should be given due weight as a diagnostic sign.

E. W. TAYLOR.

Review of Neurology and Psychiatry

(Vol. XIII, No. 1)

A Comparison of the Histological Appearances in Defined Areas of the Cerebral and Cerebellar Cortex in Cases Dying in a General Hospital with Those Dying in a Lunatic Asylum. JOHN TURNER.

This research was undertaken to ascertain whether a particular form of Betz cell was more commonly found in asylum brains, and to estimate the relative proportion of this changed cell to the total number of Betz cells in each case.

The relative frequency of gliosis in the two series; a comparison of the vessel changes, and other nerve cell changes, *e. g.*, pigmentation, are also touched upon.

As a comparison of Betz cells was in question, the pieces of brain were taken from the top of the ascending frontal convolution, including the paracentral (on the mesial aspect), where the largest specimens of this cell are found.

Pieces of cerebellar cortex from the hospital series were taken from the left lobe, posterior border, in a sagittal direction.

From the writer's recapitulation of the chief results of this study—it appears that the strictly pathological changes—gliosis, colloid degeneration and especially vessel changes—predominate in the hospital series.

Of the three changes which he considers, for reasons given in the paper, inherent anomalous conditions of nervous structure, at least two preponderated largely in the asylum cases. These two are (*a*) axonal-like Betz cells, (*b*) presence of subcortical nerve cells.

The third change is "halo degeneration," and in this the evidence is not decisive. All it absolutely allows to affirm is (1) that it occurs most commonly among the supra-granular cells, and of these it is chiefly the small outermost-lying elements which are most affected. (2) That in the insane series it is much more common in cases of dementia præcox and congenital mental defect. Probably, if the comparison had extended over a larger area of the cerebrum so as to include the higher associational regions, it would be found that the "halo cell" is more common in these regions in the insane; at all events it is found more commonly in the prefrontal area in insane cases than in the ascending frontal.

The writer believes that a more extended comparative study would be well worth making and would result in valuable information towards a theory of insanity. A number of tables accompanies the article.

(Vol. XIII, No. 2)

Paralysis of the Spinal Accessory Nerve following Many Years After the Removal of Tuberculous Glands from the Neck. A. NINIAN BRUCE.

Two cases are reported. The explanation given is that the nerve became involved in post-operative scar tissue. The paralysis ensued in one case bilaterally. Ten years previously tuberculous glands had been removed from one side of the neck, and some years later from the other side. In the other case the condition was unilateral and followed an operation "fourteen years previous to the time that the paralysis came under observation." The spinal accessory nerves did not seem to have been injured at the operation. Photographs accompany the report.

C. E. ATWOOD.

American Journal of Insanity

(Vol. LXXI, 1915, No. 3)

1. Role of Psychiatric Dispensary. C. MACFIE CAMPBELL.
2. Intracranial Injection of Autoserio-Salvarsan. D. M. WARDNER.
3. Insanity in Children. J. H. W. RHEIN.
4. Epileptic Dementia. A. GORDON.
5. Expert Testimony by Alienists and Neurologists. C. A. PORTEOUS and H. V. ROBINSON.
6. Modern Treatment of Inebriety. I. H. NEFF.
7. The Prevention of Suicide. T. A. WILLIAMS.
8. Abderhalden Tests in Psychiatry. S. T. ORTON.

9. Chronic Progressive Chorea. J. A. F. PFEIFFER.
 10. Cortex Lesions and Dementia Præcox. E. E. SOUTHARD.

1. *The Rôle of the Psychiatric Dispensary.*—A review of the work of the Phipps Psychiatric Dispensary of the Johns Hopkins University for its first year from May, 1913 to May, 1914. During this time 708 patients were admitted. Of these the largest contingent was made up of children under sixteen years of age, numbering 236. Next came psychoneuroses, 110 cases, and in order depressions of rather heterogeneous character, 68 cases; dementia præcox, 61 cases; adult defectives, 58 cases; organic brain diseases, 58 cases—including general paresis, 15 cases, and arteriosclerosis of the nervous system, 14 cases—and finally a few cases each of manic depressive insanity, paranoid conditions, alcoholism, infection and exhaustion psychoses, etc.

The author analyzes these cases, paying particular attention to the children, among whom he found cases of (1) intellectually sound but presenting neurotic or psychotic conditions, speech defects, epilepsy, tics, neuroses and organic nervous diseases; (2) intellectual defects, simple and with other symptoms as speech defect, epilepsy, hysteria, chorea, hemiplegia, sense defect, moral defect. He then gives short histories of some of the cases for whom the physicians and the social workers have been able to accomplish most.

2. *The Intracranial Injection of Autoseco-Salvarsan.*—The author introduced subdurally through a trephine hole 2 cm. in diameter, over the precentral gyrus, salvarsanized serum prepared after the method of Swift and Ellis, preceding the injection of 30 c.c. of this serum by a lumbar puncture and drawing off 20 c.c. of spinal fluid. Six cases were injected. Of these two cases after two injections showed complete remissions which at the time of this report had lasted respectively one month and two months, one case after three injections presents a partial remission, two cases have shown "marked improvement" after two and three injections, while one case has showed no change. The Wassermann reaction in the blood was reduced in all the cases and rendered negative in two cases. In only one case was it reduced in the spinal fluid, being brought down from 4+ to 2+. The globulin reaction has remained unchanged, the cell count "substantially reduced" in all cases.

3. *Insanity in Children.*—A review of the literature of the subject with a report of six cases which have come under the writer's personal observation. Of these cases the youngest was nine, the eldest sixteen years old. All of them were diagnosed as manic-depressive insanity, three of manic, two of melancholic and one of circular type.

4. *Epileptic Dementia.*—A general review of the subject in the light of the author's experience and observations, from which he draws the following conclusions: (1) Normal intellect is not incompatible with epilepsy if the attacks are not too frequent; (2) if the epileptic attacks become frequent a destructive influence is exercised upon the mind leading eventually to dementia; (3) epileptic dementia may develop at any age; (4) if epilepsy appears at adolescence the dementia resembles clinically dementia præcox; (5) when epilepsy develops in the adult the dementia may resemble dementia paralytica; (6) if an elderly person suffer from epileptic seizures his mental condition may simulate senile dementia; (7) a thorough analysis of such cases will show that the resemblance is not profound, the individual characteristics of epilepsy always present pointing out the true nature of the disease; (8) the majority of epileptic demented present family antecedents of neuropathic nature.

5. *Expert Testimony.*—A comparison in parallel columns of the testimony of several presumably well qualified men in a Canadian "cause célèbre" as showing the wide divergence in their interpretation of the evidence as to the insanity of the person under consideration, especially as to the length of time he had probably been incompetent.

6. *Treatment of Inebriety*.—A discussion of the needs of the chronic alcoholic and how they can best be met, based especially upon the Massachusetts system.

7. *Prevention of Suicide*.—Since suicide generally denotes a disturbance of the individual's power of social adjustment, it behooves the physician to work out the pathological physiology of the case and to rectify the disorder if he can. This is to be done by a careful analysis of the situation in all cases in which a suicidal attempt has been made or threatened. The author describes several cases illustrating his method of procedure, all in psychotic individuals not insane in the ordinary sense. He does not consider suicidal attempts in the really insane.

8. *Abderhalden Method in Psychiatry*.—A review of the technique and the difficulties of this test, themselves sufficiently great, while the reactions as found by different observers are more or less discordant. From this the author thinks that this test cannot be considered of any great diagnostic value in psychiatry at present.

9. *Chronic Progressive Chorea*.—A description of the clinical phenomena and a report of a careful microscopic study of the nervous system in a man of thirty-seven afflicted with chronic chorea. The cortical cells of the small and medium size showed marked degenerative changes, while the Betz cells were well preserved. There was increase of neuroglia, while in some places the tangential fibers were deficient. In the optic thalamus there was intense degeneration of the nerve cells with great increase of neuroglia, especially in the external nucleus. There was also diffuse degeneration in the lenticular nucleus. There was less change in the caudate nucleus. The vessels in the diseased areas showed enlargement of their adventitial spaces and in some instances thickening of their walls. There was slight degeneration of fibers in the lenticular loop and in the fasciculus retroflexus of Meynert, but otherwise no systematized fiber degeneration either in the brain or cord. The motor cells of the anterior horns were in general normal.

10. *Cortex Lesions and Anomalies in Dementia Præcox. Significance*.—(Concluded from Vol. LXXI, No. 2.) In a long and careful article, the author reviews the subject of the possible anatomical basis of dementia præcox, referring to a previous communication published by him in 1910, and giving a résumé of the clinical histories and the careful anatomical study at autopsy, by photographing the brains and by their microscopic examination, and discussing the clinical interpretation of his findings. His conclusions are summed up as follows:

(1) This anatomico-clinical study had in view (*a*) definite conclusions as to the structurality of the disease, and (*b*) correlation of certain major symptom groups (delusions, catatonic symptom groups, auditory hallucinosis) with disease of particular brain regions.

(2) As to (*a*) the structurality of dementia præcox, he "feels that the disease must be conceded to be in some sense structural, since at least 90 per cent. of the cases examined give evidence of general or focal brain atrophy or aplasia when examined post mortem, even without the use of the microscope."

(3) With the use of the microscope, the only two "normal looking" brains of the series of 25 gave evidence of satellitosis and cell destruction in the cerebral cortex. These cases had only lasted respectively three weeks and two months.

(4) The method of anatomical analysis involved careful gross description of the fresh brain, careful preservation—by suspension from the basal vessels—in formaldehyde, careful photography to scale of the superior, inferior (cerebellum removed), lateral and mesial aspects before and after stripping the pia mater; study of all aspects of the brain as spread side by side in photographic form; further study of the preserved brains in the light of the

photographic study; and eventually cytological or fiber studies of paired structures showing possible atrophy or aplasia.

(5) There is often more to be learned from the gross than the microscopic appearance, since of two gyri the smaller (probably agenic, aplastic or atrophic) often gives a less clear microscopic picture than the larger, in which the changes are in an earlier stage.

(6) The gross analysis gives convincing evidence of some kind of lesions. In some 14 of the 25 cases there is reason to suspect that the acquired atrophy was grafted upon a congenital agenesis or aplasia, more probably aplasia.

(7) The atrophies and aplasias, when focal, tend to occur in the left hemisphere. The coarse atrophy is usually only of moderate degree, not appreciably altering the brain weight. The heart, liver, spleen and kidneys tend to show greater loss of weight than the brain.

(8) More remarkable than the atrophy and aplasia of the cortex is the high proportion of cases of internal hydrocephalus shown by systematic study, by photography of the frontal sections.

(9) There is no evidence that this internal hydrocephalus is due to generalized brain atrophy. It was only found in cases of long duration. Clinically the hydrocephalic cases are not commonly catatonic, and the cases with marked generalized hydrocephalus had as a rule hallucinations. Delusions were not prominent—except fantastic delusions. The clinical course was unusually active and mutable, and was often interrupted by remissions.

(10) The hydrocephalic brains did not give special reason to suspect congenital disease and the author is more inclined to consider the hydrocephalus acquired.

(11) Of the 25 brains, the number showing maldevelopmental defect was estimated by different observers at from 11 to 19, while on the other hand all but 6 cases showed some acquired lesion.

(12) The general impression conveyed is that gross alterations are almost constant, microscopic changes entirely constant and that structural changes of a maldevelopmental nature lie at the bottom of the disease processes, though this last is only a suspicion.

(13) Aside from the changes occurring chiefly on the left side and the internal hydrocephalus, the predilection of these changes for the association centers of Flechsig is very striking.

(14) The author would emphasize the fact that the lesions, while readily appreciated by a skilled anatomist, are not gross, but are of the nature of mild atrophic processes and aplasia, requiring careful study, especially by comparison of photographs of different convolutions and the opposite sides of the brain for their elucidation.

(15) The author "regards this work as putting the burden of proof on those who claim the essential functionality of dementia praecox," and would object to the formulation of these changes as "incidental" or as "agenetic," though he would not deny the value "of those formulations which look on these cases as cases of faulty adaptation to environment."

(16) As to the "functional correlations of this study," "strong correlations" have been found to support the author's former claims that (1) delusions are as a rule based on frontal disease, and (2) catatonic symptoms on parietal disease. Also an equally strong correlation has now been found between auditory hallucinosis and temporal lobe disease.

(17) Though the correlation is not so decided between frontal lobe disease and delusion formation, in this as in the former series, since in one of the 25 cases there were no delusions, while seven failed to show gross frontal lesions. Two of these seven cases, however, showed microscopical lesions.

(18) The findings show, however, that there is a group of delusional cases in which even long duration does not determine "frontal emphasis of

lesions." Three of the five cases which represent this group, however, are best interpreted as cases of "hyperphantasia" in which frontal lesions are not characteristic.

(19) On the whole, the correlation between delusions and focal brain atrophy is very strong, particularly if we distinguish (1) the more frequent form of delusions with frontal lobe correlations from (2) a less frequent form with parietal lobe correlations.

(20) The non-frontal group of delusion-formations the writer wishes to group provisionally under the term "hyperphantasia." It is likely that in these cases there is disease of the posterior association-center rather than of the anterior association-center, and the anatomical findings are in favor of this view.

(21) The previous work of the author suggested a correlation between catatonic phenomena and parietal disease. In ten of fourteen catatonic cases there were parietal or post-rolandic lesions; in two grossly negative, there were microscopic lesions. Five clinically somewhat doubtful catatonic cases gave similar correlations.

(22) In four of five cases showing *flexibilitas cerea* there were gross parietal lesions. The fifth case showed microscopically satellitosis. Two of these cases showed gross lesions in the post-central gyri, hinting that *flexibilitas cerea* may be due to an altered kinesthesia.

(23) Nine out of twelve cases with auditory hallucinations showed temporal lobe atrophy or aplasia.

(24) Of the thirteen cases not marked by auditory hallucinations only three or four showed any marked temporal lobe lesions.

(25) In these functional connections the recent formulations of Kraepelin and of Bleuler have been reviewed and the present formulation seems consistent enough with either. Kraepelin seems to regard a correlation between auditory hallucinosis and temporal lesions as probable and is even inclined to incriminate the central region in motor disorders, but he does not suggest the possible kinesthetic relations of catatonia and the special (frontal and parietal) correlations with delusion formation.

(26) The recent work of the Munich School seems to draw attention away from the infrastellate cortical changes described by Alzheimer to various suprastellate changes. The microscopic work done in connection with the present study seems to indicate that while in the earlier stages infrastellate changes are most prominent, when the disease process is less acute the suprastellate changes may be more in evidence.

(27) With regard to the position which on the basis of this work can be assumed to the functional theories of Bleuler, it would seem that the lesions found could furnish a functional basis for "dissociations" or "schizophrenia," since for long periods they are mild and confined to the finer cortical apparatus. The main neuronic systems are, however, often permanently preserved, leaving an irregular and slightly simplified cortical apparatus in which a few cell changes would throw out of coördination a great deal of intact apparatus. The whole process, however, is often mild enough to permit reestablishment of relatively normal function on a slightly simplified basis, which again may become disturbed through the disease or death of still more cells.

(28) This work is a study in genesis rather than in etiology and is but a modest inquiry into factors.

(29) In summing up the author calls attention to the following points: (1) The constancy of mild general or focal atrophies in cases lasting long enough; (2) the lesions tend to be more marked in the left hemisphere; (3) they exhibit a preference for the "association centers" of Flechsig; (4) the high correlation of auditory hallucinosis and temporal lobe lesions; and (5)

of catatonia and parietal lobe lesions (*flexibilitas cerea*, especially post-central); (6) the more frequent form of delusions and frontal lobe disease; (7) the possible existence of a hyperphantasia group with parietal relations, and (8) of a large internal hydrocephalus group with catatonic and hallucinotic correlations rather than delusional.

The article is illustrated by a number of plates.

C. L. ALLEN.

MISCELLANY

NERVOUS SYPHILIS. S. F. Gilpin and T. B. Earley. (*Journal A. M. A.*, January 22, 1916.)

The value of drainage of cerebral spinal fluid in the treatment of nervous syphilis is suggested by the authors. They say that the difficulty of reaching the brain with arsenical medication in nervous syphilis suggested to them that the same mechanism which prevents the entrance of serum albumin, sugar, urea, ammonia, etc., which normally exist in the blood, but do not enter the cerebrospinal fluid, may also prevent the entrance of arsenic and mercury, and that if we reduce the pressure within the cerebrospinal cavity we would have better success with our intraspinal and our intracerebral treatment. In carrying out their method they have tried to drain off the cerebrospinal fluid once a week. "We drain off as much cerebrospinal fluid as will flow: from 20 c.c. to as high as 40. We place the patient on the side in bed. The needle used is sterilized with dry heat. The needle is inserted at the second or third lumbar interspace. The first 5 c.c. of fluid are used for testing. In the cell count the Fuchs-Rosenthal counting chamber is used. Cells are stained with methyl violet, 0.1, glacial acetic acid, 2, and distilled water, 50 parts. The specimen for the lymphocyte count is fixed at the bedside. Nonne and Noguchi tests are used for globulin. If red cells are found, the specimen is thrown out and a new specimen secured the following day. The gold-chlorid test is not considered of sufficient importance to be used, as the Nonne and Noguchi tests are sufficient for all practical purposes. In the Wassermann test for the blood and fluid, alcoholic extract of syphilitic liver is used for the antigen; 0.1 c.c. of serum and 0.2 c.c. of spinal fluid are used. We have had no bad results in draining our patients except a slight headache in one patient, and we have drained him several times since without untoward results." Three cases in which the treatment was employed with apparently very good results are reported. While the authors admit that these prove nothing, they feel justified in making the preliminary report in order to stimulate others to work in this field.

Book Reviews

THE STORY OF BETHLEHEM HOSPITAL FROM ITS FOUNDATION IN 1247. By Edward Geoffrey O'Donoghue, Chaplain to the Hospital. New York, E. P. Dutton and Company, 1915.

It is a long journey upon which the author takes us, but by no means a tedious one. We start even at Bethlehem at the ancient church at the cave of the Nativity, of which the Bethlehem hospital was one of the daughter institutions established during the early centuries in Europe and England. It was founded first as a priory, whose purpose included ministration to those in any way afflicted and in need, but it was not for a long time that its doors were open to receive as residents those diseased in mind.

The preparation of this history has required years of research on the part of the author, the result which he has dedicated to the service of the hospital. His chronicle will surely stimulate interest in the venerable institution and its extended usefulness under its revolutionized modern equipment and method. For in the past it shared the darkness and ignorance that surrounded all treatment of mental disease. The story is not told principally from the psychiatric side, but there is pictured the unwholesome, even cruel treatment which resulted from the superstitious and wholly unscientific attitude which prevented a true insight into the workings of the diseased mind. The author relates faithfully the shortcomings and mistakes, the mismanagement and even scandalous behavior of those in authority, which resulted in conditions which have contributed no doubt to the opprobrious use of the name Bedlam, one of the contractions of the original name.

No less, however, has he presented the devotion of those who truly served the hospital, from Simon Fitzmary, the donor of the first estate for the founding of the priory, down through the long line of wise and public-spirited governors and others in the control and service of Bethlehem, including those physicians who were gradually coming to a clearer understanding of mental disease and instituting the more adequate treatment which now prevails.

The chief interest in the book, aside from its value as a compilation of facts regarding the hospital, lies in the keenly human quality of the writing. Mr. O'Donoghue invites the reader to linger with him over the records that have come to his hands. He examines them carefully and fills the gaps with a legitimate use of imaginative speculation, which substitutes for a bare outline a moving panorama of persons who filled and made the history of London through these centuries of vicissitude and growth.

Bethlehem seems always to have been a center of interest, often an object of greed to royalty as well as to lesser individuals, while again it enjoyed the favor which developed its resources for its mission to the sick. It seems until a comparatively recent date to have allowed citizens to visit its wretched inmates as a form of entertainment and thus to have been in the public interest. Moreover, many a notable person has been for a shorter or longer time within its shelter for mental disability. It bears a conspicuous place also in general literature.

One could wish that such a valuable record as this could have been a little more substantially constructed. There are times when the dignity of the form is somewhat lost in a too colloquial style. Nevertheless, the book claims interest and attention throughout. The many illustrations blend most

happily with the text and enhance the impression, in many instances, of the intensely human portrayal of a long period of historical development.

JELLIFFE.

THE ADOLESCENT PERIOD. ITS FEATURES AND MANAGEMENT. By Louis Starr, M.D., LL.D. P. Blakiston's Son and Company, Philadelphia.

It is the physicians who should guard public health and enlighten parents and other instructors of youth. When will they, then, learn to understand the dynamic forces that underlie childhood and determine the increasing complexity of its development? Here is another of those books which fail fundamentally. It is sincere in purpose, presents a certain amount of facts well selected and simply arranged to give a knowledge of outward manifestations in adolescent development, with wholesome advice in matters of diet, regulation of exercise, study, imparting of sex knowledge, and contains also an elementary explanation of special pathological manifestations, nervous and mental.

It is, however, so purely descriptive that it fails to touch vital issues. It is as if certain groups of causes floated down upon soil made suitable by age, environment, or even granted psychopathic constitution, there to work their will, rather than that normal forces from within are seeking and often failing to find effective adjustments.

This latter dynamic conception would prevent such puerile superficial statements as that "more misdemeanors are committed when there is great humidity." Perhaps they are, but if so we need to know the fundamental causes of this and other phenomena rather than to have a merely external review of these things.

Starr mentions psychoanalysis as a useful method of "talking out" some violently disturbing suppressed recollection, usually sexual shock, but this narrowed reference as well as the purely symptomatic elaboration of hysteria and other neuroses show that the breadth of the psychoanalytic conception and therefore the extent of its treatment are unknown to the author.

JELLIFFE.

THE NEW PUBLIC HEALTH. By Hibbert Winslow Hill, M.B., M.D., D.P.H. The Macmillan Company, New York.

This practical book proceeds vigorously straight to the heart of its matter. The author urges a most direct attack on specific causes of disease, that is, strictly infectious germ disease. He may seem to overemphasize the uselessness of general hygiene for the building up of the physical condition as a means of resistance. But a careful reading and appreciation will show that he by no means decries or disregards these generally accepted measures, only he would insist on hunting out the enemy for attack just where the enemy exists. Abolition of infectious disease is an important contributing cause toward the building up of efficiency. A result of such it cannot be, since we know too little even of the general laws of upbuilding, and hence such a course could never be effective.

It is, moreover, stimulating to have our highly generalized and inflated conceptions of prevalence of infection, means of combating it and the like pierced by his direct concentration upon real definite facts, and the appeal to a direct bayonet charge upon them. It is well to read his list of popular beliefs in Chapter XVII and sift our own beliefs and efforts in order to discover with how much superstition we still clothe our ideas of disease and spend ourselves in fruitless labors against it.

His plan of work requires time and knowledge and faithfulness, and perhaps certain modifications, but it is directed to a definite end and employs effectual means.

JELLIFFE.

PSYCHOLOGY OF THE UNCONSCIOUS. A STUDY OF THE TRANSFORMATIONS AND SYMBOLISMS OF THE LIBIDO. A CONTRIBUTION TO THE HISTORY OF THE EVOLUTION OF THOUGHT. By Dr. C. G. Jung. Authorized Translation, with Introduction, by Beatrice M. Hinkle, M.D. Moffatt, Yard and Co., New York.

The depths of the unconscious have been gradually growing familiar to us. Jung in this book searches them with a fresh vigor of insight and in a broad unity of conception which sweeps upward also into the heights toward which unconscious striving is directed. This mastering unity of his thought, which indeed seems one with the libido he discusses, has included many sources for the portrayal of human psychology and abstracted from each those essential elements which convince us of the fundamental reality and similarity of the human psyche in its striving and in the great resistance to be overcome. The complexity which his extended gathering in of material might entail is entirely dissolved in the controlling greatness of the theme, which is nothing more nor less than the all-compelling libido. The choice and interpretation of examples of the world's artistic expression of its unconscious psychology make the book a veritable feast of fat things.

The difficulties of translation of a work so comprehensive and so profound have been admirably overcome. If at first we feel a trace of the cumbersomeness of expression with which the original text somewhat hampers the clearness of the English, that is soon forgotten in the absorbing interest of the book. This means that the translator is so thoroughly one with the author's thought and feeling that she can completely make them the reader's also. Her introduction sets forth briefly but comprehensively the general principles of psychoanalysis in the spirit of the book, that is, in its breadth of compass and purpose. She calls attention to the points of difference between Jung's development of these principles and that laid down by Freud. These differences are partly verbal and beyond that are mainly differences caused by further elaborations of the fundamental principles which are firmly adhered to as basic by both leaders, as Jung's discussion of them and his constant substantial reference to Freud shows.

Jung sets before his readers first the two forms of thinking, directed thinking and phantasy thinking. The latter is common to all and occupies us at any time as soon as directed thinking ceases. It is always busy with the contents of the past and is also the manner of thinking of the savage and the infant, representing their wishes rather than actuality. It is normally corrected by directed thinking and in turn serves to furnish the latter with the material of the past, which is below the threshold of consciousness.

Jung now introduces the phantasies of Miss Miller, an American woman who has expressed some of her unconscious life in poetic form, of the real meaning of which she herself is ignorant. He subjects them to analysis and comparison with well-known products of this sort of thinking, to some of which, like the book of Job, Miss Miller refers. The analysis discloses the underlying similarity of desire, sense of inadequacy before reality and the regressive attempt at compensation, which reveal the remarkable similarity of content and mechanism in the unconscious psychology of the entire race. The erotic root is there but it is "bound with a mysterious purpose, probably of the greatest biological meaning." The Hymn of Creation, followed by The Song of the Moth, both of which are phantasy products, express the eternal reaching of the libido toward the sun, for the creative exercise of it, which is in conflict with the regressive desire to return to the great mother, the source of life and the regressive refuge from reality. Normally the libido returns thither and experiences the fructifying power of the great mother which issues in rebirth, from which the libido arises in its creative immortal

aspect. This great mother is represented in all mythology, it exists as the incest problem for the individual. Jung frees the term incest from any narrow literal conception and makes it stand for the opposing force which would draw the libido back from its creative contact with reality, from its upward trend.

The development of this central theme unfolds the author's great concept of the libido, which he carries beyond the strictly sexual realm, making it include the whole great biological and psychological expression of man. Its history is one of alternating progressive overcoming or regressive yielding to the slothfulness and timidity innate in our nature. Jung conceives of the libido genetically as containing all the multiplicity of instincts, of which the primal sexual libido is only a special form. This sexual libido has been gradually differentiated and transformed into associated functions, which is the process we know as sublimation, but which failing leads to repression. This conception the author maintains alters the pathological terminology, for the schizophrenic manifests more than autoerotism, he has withdrawn not merely the erotic amount of libido but those portions also which were utilized in the desexualized instincts which support the entire function of reality. The same principle holds in the neuroses, where the function of reality is, however, only partly disturbed.

The discussion of the Transformation of the Libido is a most interesting revelation of its gradual sublimation through its desexualization, as it was discovered even in its sexually symbolic use that it could become creative in other spheres. This took place even through regressive phenomena, which were probably once of still easier occurrence than to-day. The origin of fire is given as an example of a sexual act symbolically performed but pushed by some prohibition against sexuality into the regressive stage of masturbation. But out of this arises the useful art of fire kindling, which gradually loses its sexual significance.

The prohibition which has arisen thus early against sexuality is the incest problem which again is called by Freud the "nuclear complex," which, as Jung says, causes the disturbance of the normal ambivalence toward both the subjective and the objective which is the "indispensable preliminary requirement for the perfection and coordination of an act." All mythology, all religion, as all individual phantasy and endeavor, are concerned with this great problem, the overcoming of the incest through renewed life, the rebirth, and at the same time how to attain this rebirth without incest. For man is under necessity "to redeem those dynamic forces which lie bound up in incest in order to fulfil himself."

It is impossible to enter into the wealth of mythology and religion with which the author follows this conflict and the expression of victory, complete or partial. Perhaps it is never complete for there comes always the setting of the sun and the waning powers of life turn again to the primitive mother, but this is not until the course of the sun has been followed, the day's work has been done and immortality assured in procreation and achievement. The analysis of our American epic *Hiawatha* reiterates the recurrence of the incest problem, as the young hero, bound to the grandmother, always returning to her, is yet ever thrust out by her to further deeds of conquest and beneficent acts for his people, only after which he is freed in himself to seek and win his bride. He too turns at the end of an active life toward the sunset and the western sea, which is a universal mother symbol.

The author's discussion of Christianity in its service as a means of escape from the sensuality in which the world was steeped, under the domination still of antiquity, is of exceeding interest. The incest problem, however, has appeared in our religion in another form. The incest wish is transformed into those acts and concepts which grant symbolic satisfaction to the infantile

desire in the ideal heaven, the ideal fatherhood of God and the ideal brotherhood of man, all of which keep man in a state of perpetual infantilism. This symbolism has had its usefulness in preserving mankind from the overwhelming opposites belonging to reality, but humanity ceases to be satisfied with this. We need now to base our lives on knowledge rather than phantasy. "*Belief*," the author says, "*should be replaced by understanding*; then we would keep the beauty of the symbol but still remain free from the depressing results of submission to belief. This would be the psychoanalytic cure for belief and disbelief."

This book will be an inexhaustible store of inspiration and suggestion for the psychoanalyst, lifting him out of the smallness with which the detail of the day sometimes seems to threaten him, giving him the broader concept of the great human problem which he strives to bring to the patient. Its psychology and its literary value give it an equal worth for all readers.

JELLIFFE.

DIE GEISTESKRANKHEITEN DES KINDESALTERS. EINSCHLIESSLICH DES SCHWACHSINNS UND DER PSYCHOPATHISCHEN KONSTITUTIONEN. By Dr. Theodor Ziehen. Reuther and Reichard, Berlin.

The simple directness and clearness of the form of this book express the authoritative familiarity of the author with his subject. Ziehen speaks of what he knows by his long experience with the mental diseases of children.

He reviews them here briefly but instructively and with sufficient illustration from his own numerous cases. His classifications are based on very definite general divisions which group together those forms of defect manifestly similar according to the most logical conclusions from clinical observations.

For example, his two great divisions are the psychoses with defective intelligence and the psychoses without such defect, and under these distinct place is given to the various forms that appear as to their hereditary conditioning or acquired character, dependence upon arrested brain development or induced changes in the brain, clinical pictures, secondary manifestations, etc. The several grades of intellectual defect are very clearly distinguished.

Considerable space is given to outline and elaboration of the examination methods, which have become widely known and used. It is specially instructive to have them presented thus fully, as Ziehen himself applies them. His outlines of treatment, particularly of defective children, are very practically suggestive.

One looks in vain, however, for any recognition of the newer psychology that penetrates the deeper causes, with their therapeutic and prophylactic intimations. This is a very complete and careful review of the manifold forms and manifestations of children's mental diseases, but all on the purely conscious levels. This is particularly noticeable in the discussion of dementia hebephrenica. It is astonishing still to hear an authority like Ziehen characterize the delusions of these patients as "absolute senselessness" without any reference to their rich and fully determined complex content.

JELLIFFE.

The Journal OF Nervous and Mental Disease

An American Monthly Journal of Neurology and Psychiatry Founded in 1874

Original Articles

DIFFUSE SARCOMA OF THE PIA ENVELOPING ENTIRE CORD¹

BY PETER BASSOE,

CHICAGO

AND C. L. SHIELDS,

SALT LAKE CITY

The patient, a girl sixteen years old, was admitted to the Presbyterian Hospital on December 3, 1910. Aside from a few attacks of tonsillitis she had been in good health until March, 1910, when she had an attack of headache, vomiting, and dizziness lasting one week. Following this she was well for a month, and then had a second and similar attack, also lasting one week. In May vision began to fail so that she had to give up her school work. In June there were two weeks of strabismus, the left eye being at fault, and the mother thinks it deviated outward. She could see a little until the day of admittance to the hospital when she became completely blind.

Hearing in the right ear had been impaired for two years (never discharge), and two weeks before admittance she became very deaf in both ears and complained of noises in the ears. From the beginning of July to the middle of November she was almost entirely free from headache and vomiting, but during two weeks preceding admittance these symptoms returned and she gradually became stuporous. A few hours before starting for the hospital she breathed irregularly and the extremities became cold, so she was thought to be dying, but she rallied in a few minutes.

Condition on Admittance.—The patient was lying quietly in bed sleeping and could only be aroused with difficulty. She could hear

¹ Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

when spoken to loudly, but seemed to be totally blind. The neck was stiff; otherwise, the muscles were completely flaccid. Kernig's sign was absent. All tendon reflexes were absent. Abdominal and plantar reflexes were normal. The pupils were equal, dilated and reacted fairly well; there was conjugate deviation of the eyes to the right; bilateral optic atrophy, more marked in the right eye, probably secondary. No paralysis could be made out.

Examination of the chest and abdomen was negative. Temperature on admittance, 98.8° ; it reached 100.4° on December 5; then varied between 98° and 99.5° during the remainder of her stay in the hospital.

On December 7 lumbar puncture was made. Fluid clear, under greatly increased pressure; eight c.c. removed. Marked lymphocytosis and positive butyric acid globulin test. On December 9 puncture was repeated and fifteen c.c. removed; pressure not as great as before. December 15 ten c.c. were removed and pressure again high. The Noguchi modification of the Wassermann test was reported positive with the blood.

December 14, the patient had an attack in which she straightened out, with eyes rolled backward, and breathing became stertorous. The left eye was closed and the mouth was drawn a little to the left. The extremities were rigid but no definite paralysis could be demonstrated. The attack lasted about ten minutes.

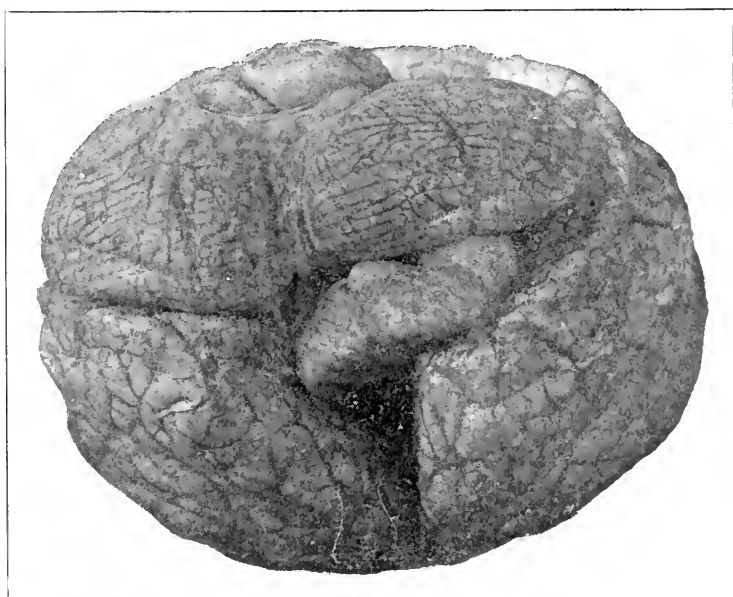


FIG. 1. Tumor above cerebellum.

After a few days she improved materially and became quite bright. She said she could hear the watch on contact, but the noises in the head prevented her from hearing people's voices. The tendon reflexes were persistently absent and the eyes were generally

turned to the right. The urine at first contained albumin and numerous hyalin, granular and epithelial casts. Later it was normal.

On December 24 there was an attack of left-sided convulsions lasting fifteen minutes. Other convulsions occurred on December 26, 30, 31 and January 1. On January 1 the breathing became of the Cheyne-Stokes' type and on January 4 cyanosis set in and the patient died.

The necropsy was held a few hours after death. Anatomic diagnosis: Diffuse tumor of the pia of the cord and bulb (endothelioma?). Tumor of pia of cerebellum; edema and hypostatic

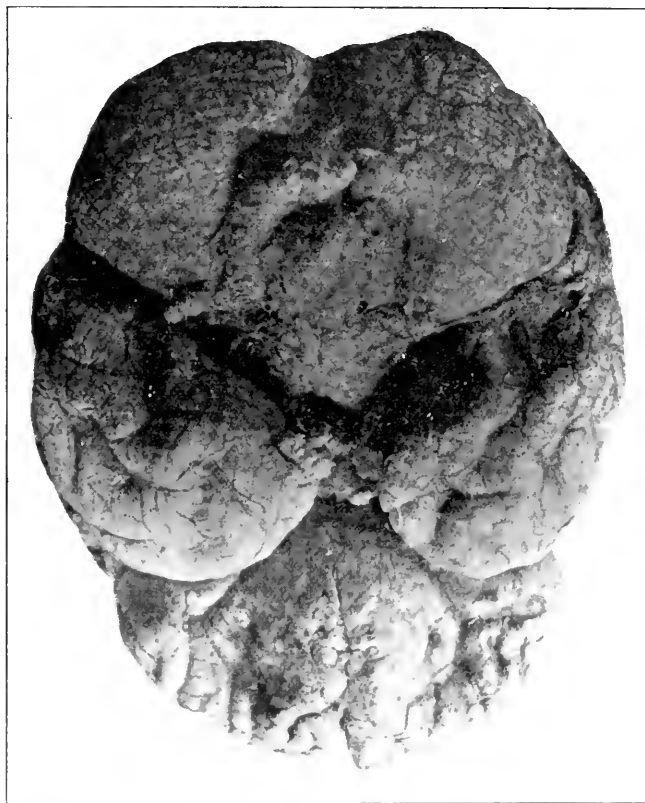


FIG. 2. Showing moulding of lower portion of cerebellum, and projecting tumor above cerebellum on left side.

hyperemia of the lungs; slight healed aortic and mitral endocarditis; passive hyperemia of the liver and kidneys; chronic catarrhal bronchitis; chronic follicular tonsillitis; sordes of the tongue; small follicular ovarian cysts.

Only the more important details will be related. Resting on the deeply indented upper surface of the left lobe of the cerebellum

there is a flattened, roundish, greyish tumor (Fig. 1) measuring $4.5 \times 4 \times 2$ cm. and weighing 19 gms. It extends 1 cm. to the right of the median line. Behind the bulb, about the edge of the foramen magnum there is a rounded lip 1 cm. in diameter forming a semicircle, indicating a moulding process produced by the increased intracranial pressure (Fig. 2). The surfaces of cerebrum,

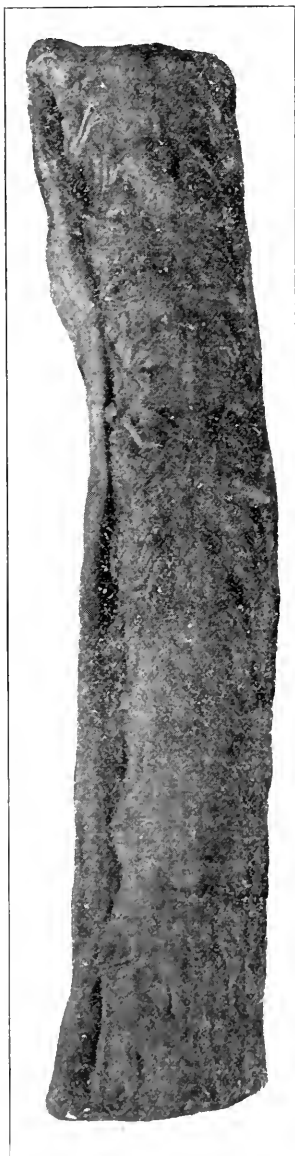


FIG. 3. Diffuse tumor of spinal pia.

cerebellum, pons and bulb show no macroscopic pial thickening, and the dura is normal. The entire posterior surface of the cord is coated by a greyish-white tissue infiltrating the pia, in which the roots are imbedded (Fig. 3). Cross sections show the greatest thickness of the tumor to be in the median line while it tapers

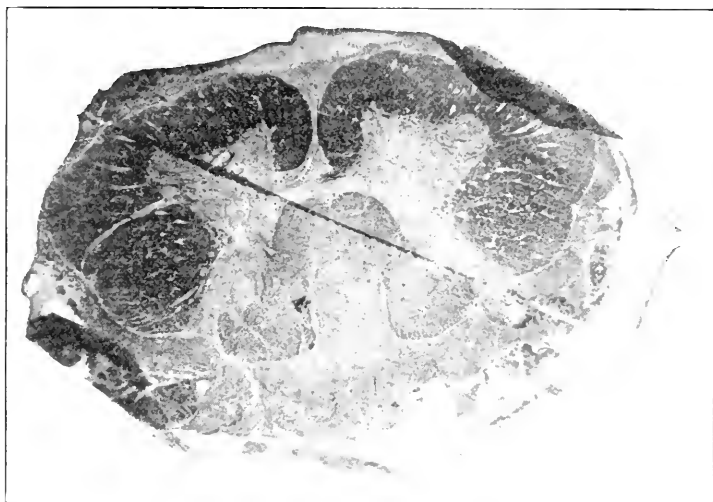


FIG. 4. Seventh cervical segment. Pial tumor and posterior column degeneration.

toward either lateral border, as will be seen in any picture of a cross section of the cord (Figs. 4, 5, 6). Its greatest thickness, at the seventh thoracic segment, is 7 mm. From here it decreases upward to the first thoracic, where it measures 1.5 mm., and then again increases to the first cervical, where it is 6 mm. thick. At the latter level it extends as a distinct growth around the posterior two thirds, but in the anterior third it only can be recognized microscopically as a ribbon of cells along the pial surface. The tumor is continuous to the very end of the filum terminale.

Histologic Examination.—The cord tumor presents the same essential features everywhere. It consists of round cells, with deeply stained nuclei, in densely packed rows or masses, along the pial framework or around the numerous vessels. The cytoplasm is scarce and indistinct. Inside the very fine or sometimes thicker fibrous strands no fibers of any kind are seen and whole immersion lens fields are made up of round cells without any visible intercellular substance. Nothing suggestive of glia is seen in the pial tumor, the structure of which is best described as round-celled alveolar sarcoma, though the alveolar feature is not marked. At all levels extension into the cord along the vessels and pial septa is seen, but nowhere is there any macroscopic tumor in the cord, or any tumor areas larger than the typical ones seen in Figs. 7 and 8. The roots, especially the posterior ones, are generally surrounded, and

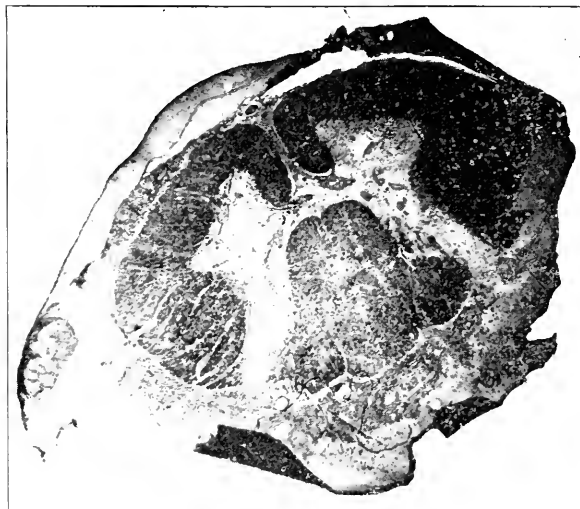


FIG. 5. First thoracic segment.

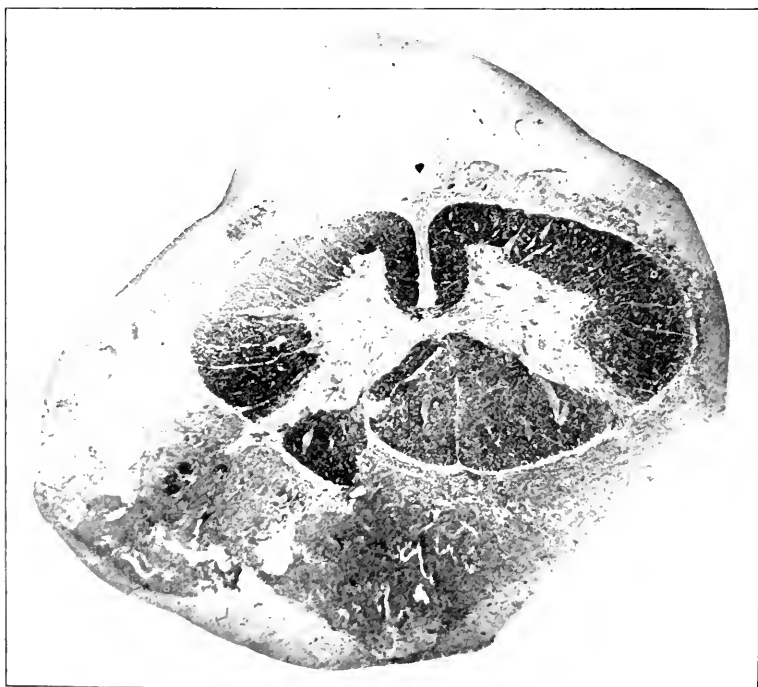


FIG. 6. Third lumbar segment.

invaded by tumor. This condition is maintained even in the caudal region. Invasion of the cerebellum and bulb similar to that in the cord is also present.



FIG. 7. Third cervical segment showing pial tumor and extension into cord along the vessels.

Secondary degeneration of the cord is marked in the posterior columns, as seen in Figs. 4 and 5 and 6, made from Weigert-Pal specimens. The column of Goll in the cervical region shows the most severe degeneration.

The tumor resting on the cerebellum shows a more mature and less malignant structure, with more fibrous tissue and a tendency to a spindle-shape of the cells. In places there is a whorl-like structure suggestive of neurofibroma. Such a tumor encountered singly would generally be designated fibro-sarcoma.

Histologic Examination of the Viscera.—The liver is congested. There are a few groups of small round cell infiltrations; otherwise there are no changes.

The thyroid is full of colloid. The lining cells of the glandular alveoli have assumed a distinctly flat type.

The pancreas is congested; especially some of the islands of Langerhans.

In the adrenals are a few small areas of fatty degeneration. The capillaries are distended with blood; otherwise there are no evident abnormal changes.

The heart muscle is slightly edematous. Otherwise it is normal.

The kidneys are congested; there is a moderate amount of

desquamation of epithelium into the tubules. In a few small circumscribed areas there is blood in the tubules.

In the lung there is a well defined area of hemorrhage into the air cells. Edema is present throughout this section.

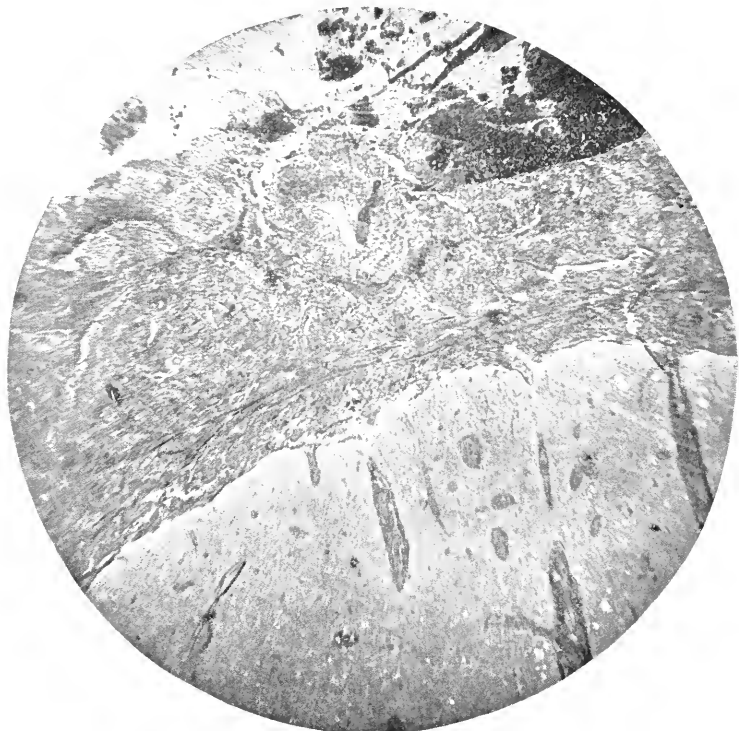


FIG. 8. First cervical segment. Minute perivascular tumor infiltrations throughout cord.

COMMENT

This case belongs to a well-known group in which in addition to diffuse sarcoma of the spinal pia there exists a definite larger tumor in the posterior cranial fossa. In this instance the only large tumor rested on the cerebellum and has the structure of a sarcoma arising from the meninges. Its size and more mature structure mark it as antedating the much more cellular diffuse cord tumor, and the early symptoms,—headache, vomiting, dizziness and failing vision—can be explained by the presence of this tumor. Presumably a rapid dissemination along the pial surface took place later. The evolution of symptoms in this case, together with the lymphocytosis and increased globulin content of the spinal fluid led to a tentative clinical diagnosis of tubercle of the cerebellum and secondary tuberculous

meningitis, an error not uncommonly recorded in the literature of cases of this kind. In seven cases in the literature closely resembling this one the facts regarding early symptoms were as follows: In Ollivier's patient, a boy of eleven years, headache, vomiting and convulsions were first noted, later retraction of the head and blindness, no paralysis. Duration six months. Post mortem: Pigeon's egg sized sarcoma of pia of upper surface of cerebellum; diffuse sarcoma along entire posterior surface of cord. Schultze's patient, a girl of seven years, was taken with headache, vomiting and somnolence. Later papillitis, stiffness of neck and back and paralysis of both legs. Duration five months. Post mortem: Round celled sarcoma of cerebellar pia; nodular and diffuse infiltration of spinal pia. Coupland and Pasteur, Case 2, a girl four and a half years old; onset with headache, strabismus, papillitis, early blindness. Duration three months. Post mortem: Round celled sarcoma of cerebellar vermes; diffuse and nodular sarcoma of posterior surface of entire cord and of base of left temporal lobe and chiasma. In Richter's patient, a boy of nine years, stiffness of the neck, vomiting, and convulsions were first recorded. Duration eleven weeks. Post mortem: Alveolar sarcoma of vermis; nodular and diffuse infiltration of spinal pia, with invasion of posterior horns. Harbitz, of Kristiania, reports the case of a man, twenty-nine years old, ill for seven weeks only; onset with backache, headache and chills, later drowsiness and flaccid paralysis of legs. Post mortem: Endothelioma of cerebellum invading fourth ventricle; infiltration of pia of entire length of cord. Hartman, of Galveston, describes a man, twenty-one years old, taken with numbness and weakness of the legs, later papillitis and drowsiness. The spinal fluid was greenish and coagulated spontaneously. Duration two months. Post mortem: Small round celled sarcoma of cerebellum; complete investment of entire cord by diffuse pial sarcoma; rounded tumors on roots of cauda. Batten's patient, a boy of ten years, was taken with headache and nausea, later vomiting and papillitis, stiff neck, deafness, convulsions. Diagnosis at first was tuberculous meningitis. Duration nine months. Post mortem: Tumor of cerebellum and fourth ventricle; diffuse pial tumor at base of brain and of whole length of cord.

LITERATURE

The early cases are fully reviewed in the article by Weaver. Those of Rach, Grund, Rindfleisch and Batten give extensive reviews, the first named an elaborate table as well. For sake of convenience the references to the most important literature may be grouped as follows:

I. CASES OF DIFFUSE (OR DIFFUSE AND NODULAR) PIAL SARCOMA ONLY; NO "PRIMARY" OR "CENTRAL" TUMOR

- Bennett, G. H. Trans. Clin. Soc., London, 1885, 18, 168.
 Coupland & Pasteur. Trans. Path. Soc., London, 1887, 38, 26 (Case 1).
 Cramer. Dissert. Marburg, 1888.
 Fox, E. L. Bristol Med.-Chir. Jour., 1883, 1, 104.
 Hadden. Trans. Path. Soc., London, 1887, 38, 26.
 Holmsen. Abstr. in Neurol. Centralbl., 1902, 21, 552.
 Hoffman, H. Jour. f. Psych. u. Neurol., 1915, 21, 77.
 Janssen, D. V. Virch. Arch., 1894, 139, 213.
 Lissauer. Centralbl. f. allg. Path., 1911, 22, 49.
 Nonne. Deut. Zeitschr. f. Nervenheilk., 1902, 21, 396 (Case 2).
 Rach. Zeitschr. f. Heilk., 1907, 28 (Suppl.), 78 (Case 4).
 Redlich. Jahrb. f. Psych. u. Neur., 1905, 26, 351.
 Schroeder. Monatssch. f. Psych. u. Neur., 1899, 6, 352.
 Schulz, R. Arch. f. Psych., 1885, 16, 592.
 Virchow. Virch. Arch., 1859, 16, 180 (melanotic tumor).

2. CENTRAL TUMOR IN CEREBELLUM

- Batten. Proc. Royal Soc. of Med., 1908, Vol. II, 2, Neur. Section, p. 12.
 Coupland & Pasteur. L.C. (Case 2).
 Harbitz, F. Norsk. Mag. f. Laegevid., 1896, 11, 1189.
 Hartman, H. Texas State Jour. of Med., 1915, 10, 278.
 Lobeck. Diss. Leipzig, 1901.
 Ollivier. Traité des maladies de la moelle, 1837, II, 490.
 Richter. Prag. Med. Woch., 1886, p. 213.
 Schultze, F. Berl. klin. Woch., 1880, 17, 523.

3. CENTRAL TUMOR IN CEREBRUM

- Askanazy. Verh. d. deutsch. path. Ges., 1902, Bd. 17.
 Grunbaum. Path. Soc. Trans., 1906, 57, 313.
 Lenz. Ziegl. Beitr., 1896, 19, 663.
 Rach. L.C. (Case 3).
 Rindfleisch, W. Deut. Zeitschr. f. Nervenheilk., 1904, 26, 135 (Case 3).
 Rosenblath. Deut. Zeitschr. f. Nervenheilk., 1906, 31, 335 (Case 9).
 Weaver, G. H. Jour. Exp. Med., 1898, 3, 669.
 Westphal. Arch. f. Psych., 1894, 27, 770.

4. CENTRAL TUMOR IN CORD

- Orlowsky. Neur. Centr., 1898, 17, 92.
 Pfersdorff. Inaug. Diss. Strassburg, 1900.
 Schlagenhaufen. Obersteiner's Arbeiten, 1900, 7, 208.
 Schlesinger. Beiträge zur Klinik der Rückenmark- und Wirbeltumoren, 1898 (Case 31).

5. METASTATIC DIFFUSE SARCOMATOSIS OF PIA WITH PRIMARY TUMOR OUTSIDE NERVOUS SYSTEM

- Schlesinger. L.C. (Case 32).
 Stursberg, H. Deut. Zeitsch. f. Nervenheilk., 1907, 33, 68.
 Schutz, O. Monatsschr. f. Psych. u. Neur., 1909, 25, 138.

6. DIFFUSE GLIOMATOUS INFILTRATION OF PIA

- Barrett, A. M. Amer. Jour. of Insanity, 1913.
 Fischer, O. Zeitschr. f. Heilkunde, 1901, 22 (Path. Anat.), 344.
 Grund, G. Deut. Zeitsch. f. Nervenheilk., 1906, 31, 283.
 Pels-Leusden. Ziegl. Beitr., 1898, Bd. 23.
 Schmincke, A. Frankfurt Zeitschr. f. Path., 1915, 16, 357.
 Spiller, W. G. Jour. of Nerv. and Ment. Dis., 1907, 34, 297.
 Strassner. Deut. Zeitsch. f. Nervenheilk., 1909, 37, 305.

(a) SYRINGOENCEPHALIA. SYRINGOENCEPHALOMYELIA

(b) THE FUNCTION OF THE PYRAMIDAL TRACT*

BY WILLIAM G. SPILLER, M.D.

PROFESSOR OF NEUROLOGY IN THE UNIVERSITY OF PENNSYLVANIA

It has been asserted that syringomyelia does not extend above the lower part of the pons, and Schlesinger, in the second edition of his monograph on syringomyelia, published in 1902, stated that the cavity had never been observed above the upper end of the facial nucleus, therefore the only cranial nerves implicated by the syringomyelic process are the fifth to the twelfth inclusive. If other cranial nerves appear to be affected it is not by this process but by associated hydrocephalus, paresis, tabes or other lesion.

In the study of a case reported in 1906 I showed that the syringomyelic process may extend through the spinal cord, through the pons, cerebral peduncle and basal ganglia almost into the lateral ventricle. There seems to be no other case with this extensive implication of the brain in literature, but the one case shows that the terms syringomyelia and syringobulbia are inadequate to express the extensive implication of the central nervous system that syringomyelia may assume. I therefore propose the term syringoencephalia, or for a still more general disorder, when both brain and cord are affected, syringoencephalomyelia. We need the more limited term syringoencephalia, for although as yet no case to my knowledge is to be found in literature in which only the brain is implicated by the cavity process, I propose to show in the present paper that such a condition occurs in rare instances.

An interesting case has come under my observation which assists with other findings in giving me a foundation for the statements made above. It also permits conclusions concerning the functions of the pyramidal tracts. The observations made of the patient are not as complete as would be desirable, as the child was brought to the Nervous Dispensary of the University Hospital only once or twice and opportunity was not given for a thorough study.

* Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

E. N., 8 years of age, was referred to the nervous dispensary of the University Hospital by Dr. Wm. Jackson Merrill, March 10, 1915.

The parents were alive and well. He had four brothers and four sisters living and well. The mother had never had any miscarriages. The boy was the sixth child. He was born at full term in normal birth without instruments and was bottle-fed. The father said that when the boy was a year old he had a severe attack of convulsions and was very sick about three days. He was backward in talking and according to the father did not talk until he was three years old. At four years of age he had what was considered rheumatism of the right knee and had pain in his knee when he walked. He had electric treatment for three months and by the end of this time he seemed to be lame when walking. The pain in the right knee lasted about two months.

At the examination, March 10, 1915, both feet were deformed in a manner suggesting the foot deformity of Friedreich's ataxia, *i. e.*, the great toe was hyperextended at the first phalanx and flexed at the second. He had marked talipes equinus on the right side, and an indication of this condition on the left side. Sensation to touch was normal in both lower limbs. He was able to walk without much difficulty and had good power in his thigh muscles, but the power in the right peroneal and possibly right calf muscles was diminished. Extension and flexion of the right toes were weak although the extensor longus hallucis was strong. The lower limbs were not spastic.

The left hand, except the fingers, and the left arm and forearm seemed to be about normal in motor power, but there was some weakness in the flexion of the left fingers. He could not use his left fingers in a normal manner, he could not extend the left index finger alone and flex the other fingers, but he could use the left fingers all together. The left upper limb was slightly spastic. The disturbance of the left upper limb, the father stated, began about the same time that his right knee began to give him trouble, *i. e.*, about four years before he came to the nervous dispensary, but it is probable that this was merely the time at which the disability was first noticed by the parents. In the finger to nose test he occasionally missed with his right forefinger.

No weakness of the facial muscles was noticed, at least there was no weakness that could be detected without careful examination, there was nothing to arouse suspicion that these muscles were weak and they were not put to careful tests.

The case was regarded by me as one of cerebral diplegia and a Wassermann test was made, but was negative.

Dr. de Schweinitz had examined the boy July 16, 1914, and had found bilateral zonular (congenital) cataracts.

Tenotomy of each Achilles tendon was done May 5, 1915. The boy was very restless following this operation, he had convulsions on May 8, 1915, and died on this day. The necropsy showed that he had status lymphaticus.

The brain only was obtained for microscopical examination. The

basal ganglia of each cerebral hemisphere were cut in serial sections. The exterior of each cerebral hemisphere appeared to be well developed. The basal ganglia of the left side showed no lesion, but on the right side in sections from the upper levels of these ganglia a cavity (Figs. 6, 7 and 8) was found extending from the lateral ventricle into the knee of the internal capsule.

In a section from the uppermost part of the basal ganglia at some places near this cavity were small openings lined with ependymal cells (Fig. 10) resembling the structure of the tissue about the central canal of the spinal cord. In other places the ependymal cells formed rows or masses like in the gliosis so common about the central canal. The neuroglia lining the cavity was denser than normal neuroglia and the cavity had well defined walls, showing that it was not an artefact. As the neuroglia proliferation passed into the normal surrounding tissue numerous nerve fibers poorly stained by the Weigert hematoxylin method were seen, but no nerve fibers were seen close to the cavity. The cavity extended from the posterior part of the head of the caudate nucleus to about the middle of the posterior limb of the internal capsule, and while the fibers at the knee and a little posterior to the knee were preserved at the highest levels of the basal ganglia, these fibers were entirely wanting at lower levels (Fig. 9), and about half of the fibers of the posterior limb were thus defective. The extent of this defect was best determined at high levels where the cavity was widest and was not surrounded by great proliferation of neuroglia. Below the cavity the small amount of the neuroglia proliferation had caused the area of arrested development to appear less extensive. (Compare Fig. 6 with Fig. 9.)

The lesions were confined to the right pyramidal tract and did not implicate the basal ganglia extensively.

The right pes pedunculi (Fig. 11) contained fewer fibers than the left, except in the fasciculus of Türk (external bundle of the pes pedunculi), and the fibers present were nearly uniformly scattered through the pes, although only the anterior half of the posterior limb of the internal capsule was defective. There was no proliferation of neuroglia in the pes. The right anterior pyramid in the medulla oblongata was about half the size of the left (Fig. 12) in the upper part of the medulla oblongata, but lower in the medulla oblongata it was still smaller.

The right paracentral lobule contained many Betz cells, the sections did not stain well, but the Betz cells were numerous and did not appear to be atrophied, and their nuclei were central. The same may be said of the left paracentral lobule.

In Piersol's Anatomy the following description of the embryological development of the central canal is found:

"In regard to the embryology of the spinal cord, during the sixth week the form of the tube-lumen becomes further modified by the elongation and narrowing of the dorsal part of the canal in conse-

quence of the approximation of its walls, which in the course of the seventh week is closer and, by the end of the seventh month, is completed by the meeting and fusion of the adjacent inner layers, with obliteration of the intervening cleft and the production of the posterior median septum in its place. Since the partition is formed by the union of the inner (ependymal) layers, it is probable that the septum is to be regarded as essentially neuroglial in origin and character. . . . The remaining and unclosed part of the lumen for a time resembles in outline the conventional spade of the playing card, with the stem directed ventrally; but later gradually diminishes in size



FIG. 1. Cavity left by deficient closing in of the posterior columns of the spinal cord, a chance finding in an adult. A cavity such as this is liable to enlarge and give the symptoms of syringomyelia.

and acquires the contour of the definite central canal" (p. 1049). (Figs. 906 and 907, p. 1050.)

Occasionally the posterior septum does not form in the usual manner and a triangular opening with the base over the central gray

matter is left. Later in life this embryonic cavity may enlarge and then the symptoms of syringomyelia may appear. A cavity of this type, a chance finding in a case I studied some years ago, is represented in Fig. 1. (Compare this cavity with that represented in Fig. 6.) It is not uncommon to find collections of neuroglia cells in the spinal cord posterior to the central canal. There may be groups of ependymal cells, as a diverticulum of the central canal or a duplication of the central canal. These periependymal cells may change into ordinary neuroglia cells (Bischofswerder), and the latter may assume the appearance and arrangement of the ependymal cells when they line a cavity (Saxer). Haenel, in his article in Lewandowsky's *Handbuch der Neurologie*, gives a beautiful picture of this cellular proliferation about the central canal with duplication of the canal, such as many of us have seen in the central gray matter of the spinal cord. Thielen states that the ependyma not only may grow in gland-like tubules, but may change into diffuse tumor cells, losing their typical form. They may again become cylindrical in suitable location as when they line a cavity.

In 1902 I reported a case of hydrocephalus implicating all the ventricles except the fourth, causing the symptoms of cerebellar tumor. The aqueduct of Sylvius was entirely occluded when examined by the naked eye, but in microscopical sections a very small opening was found (Fig. 2). Small groups of ependymal cells were seen in several places, and these had evidently been separated from the ependymal lining by the proliferation of the neuroglia. I called attention in this paper to the fact that the closure of the aqueduct resembles in the changes of tissue produced by it the condition often seen in the region of the central canal of the spinal cord. In some places the neuroglia had proliferated beyond the ependyma and inclosed the latter within it.

I reported with Dr. A. R. Allen in 1907 another case of hydrocephalus caused by occlusion of the aqueduct. The occlusion was almost complete, and probably was a congenital malformation, because the cavity was well lined throughout by a layer of ependymal cells, which would hardly be the case if the occlusion were caused by proliferation of the neuroglia. The neuroglia immediately adjoining the ependymal lining was a little proliferated. In a microscopical section the aqueduct to the naked eye was hardly as large as the point of an ordinary pin. The finding indicated that in the closing in of tissue forming the aqueduct in the embryonal period the process had been carried beyond the normal degree and had terminated in almost complete occlusion. These findings convinced me that a proc-

ess may occur about the aqueduct of Sylvius resembling very closely, and probably identical with, that seen more frequently about the central canal of the spinal cord.

The aqueduct of Sylvius at one period of embryonic life is relatively large but in the development of the brain loses much of its size and assumes the proportions of the small passage seen in the brain at birth. In Piersol's *Anatomy* (p. 1117) this condition is described as follows, "The mesencephalon or mid-brain for a time



FIG. 2. An aqueduct of Sylvius almost occluded by proliferation of neuroglia. In some places the neuroglia has overgrown the limiting layer of ependymal cells and has enclosed these cells within it. In this case the occlusion of the aqueduct caused pronounced hydrocephalus of the third and lateral ventricles.

possesses a spacious cavity, but it fails to keep pace to the growth of the adjoining parts; its walls thicken and its lumen becomes eventually reduced to the narrow sylvian aqueduct." I have thought it would be of importance to study in a series of brains the shape, size

and general condition of the aqueduct. I have therefore taken microscopical slides from 38 unselected brains in which sections of the aqueduct were contained. The results have been interesting and somewhat surprising. The opening varies greatly, and nests of ependymal cells about the canal are not uncommon. It is possible that glioma may have its origin in later life from these cell nests, as they probably do in the spinal cord, but as such nests are more common in the spinal cord the glioma or proliferation of glia (gliosis) is more common there than about the aqueduct. I found in my study of the aqueduct of Sylvius that the cavity may be oval with a



FIG. 3. Long slit-like cavity extending below the aqueduct of Sylvius and resembling in its formation by defect in closing in of tissue the cavity represented in figure 1. Several layers of ependymal cells may be seen at the bottom of this cavity. In some cases such groups of ependymal cells are left enclosed within the nervous tissue.

layer of ependymal cells lining it and with a few processes extending into the lumen, or at some places small masses of ependymal

cells may extend from the ependymal lining into the surrounding tissue. The cavity may be T shape with the two sides of each arm almost touching, and small cavities lined with ependymal cells and resembling a central canal may be found about the aqueduct.

A line of ependymal cells in masses containing ependymal lined cavities may lie at a short distance from the aqueduct and be independent of the ependymal lining of the aqueduct.

The glia beneath the ependymal lining may show a greater density than that a little more remote.

The aqueduct may be triangular with the base down instead of

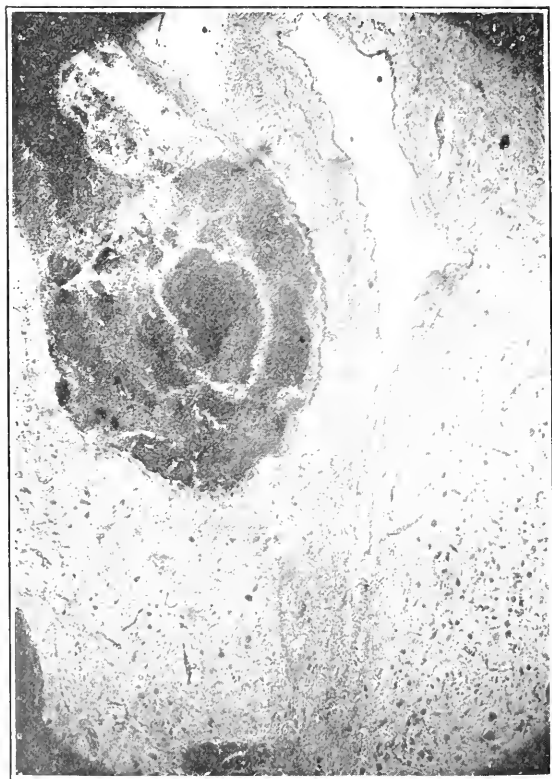


FIG. 4. Obstruction of the aqueduct of Sylvius by a congested blood vessel with hemorrhage. Ependymal cells at the lower part of the slit-like prolongation are seen inclosed in the nervous tissue. An obstruction such as this by causing permanent narrowing of the aqueduct might lead to hydrocephalus, and yet it is astonishing how small an aqueduct is sufficient to prevent excessive accumulation of fluid in the lateral and third ventricles.

up, as in most cases. It may be merely a narrow transverse slit with several layers of ependymal cells in places.

embryonic period, and the study recorded in this paper justifies this conclusion. I found in the microscopical examination of the brain of the child E. N. that the fissure existing in the embryo between the optic thalamus and the corpus striatum (Fig. 5) had failed to close entirely to form what is recognized in the brain at birth as the opto-striate fissure or notch, called by Dejerine in his anatomy of the nervous system *sillon opto-strié*. This failure to close in according to the usual method had left a fissure extending from the lateral ventricle into the brain (Figs. 5, 6 and 7), leaving undeveloped the anterior half of the posterior limb of the internal capsule. It is interesting to note that this undeveloped part of the cap-

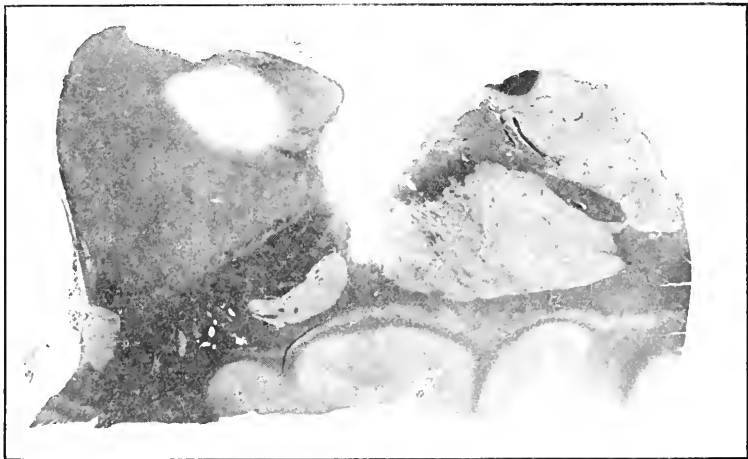


FIG. 6. Section from the uppermost level of the right basal ganglia. The failure in the closing in of the right opto-striate fissure is well shown. The oval hole in the optic thalamus is an artifact. The opto-striate fissure extends to the middle of the posterior limb of the internal capsule, invading very slightly the lenticular nucleus. The nerve fibers in the anterior part of the posterior limb at this level appear well stained, but at lower levels they disappear. The section is taken a short distance below the floor of the lateral ventricle.

sule contained neuroglia tissue and presented the appearance in limited degree seen in secondary degeneration when a lesion destroys the nerve fibers at a higher level, but the neuroglia proliferation even near the fissure was small in amount. It was denser about the fissure, possibly as a result of irritation from the pressure of the cerebrospinal fluid in the ventricle, and extended only a short distance below the fissure. There was no increase of neuroglia in the foot of the cerebral peduncle (Fig. 11) or in the pyramidal tract below this region (Fig. 12), and this absence of neuroglia prolifera-

tion is to be explained by the fact that tissue already formed was not destroyed. There was merely a failure of development in a limited part of the pyramidal tract, and therefore no cause for the neuroglia proliferation which occurs when nerve fibers are destroyed.

The opto-striate fissure in the brain of E. N. was surrounded by moderately proliferated neuroglia and some nests of ependymal cells (Fig. 10). It seems in place to recall here the embryological development of this part of the brain in order that we may understand the character of this diverticulum from the ventricle.

The description of the development of the corpus striatum and optic thalamus as given by Piersol's Anatomy is as follows:

"The anlage of the corpus striatum, the fundamental ganglion of the end-brain, is recognizable very early, and in brains of the fourth week appears as a triangular elevation between the cavity of the pallium and the optic recess. Somewhat later this elevation, produced by a local thickening of the brain-wall, is seen projecting from the infero-lateral wall of the pallium just in advance of the

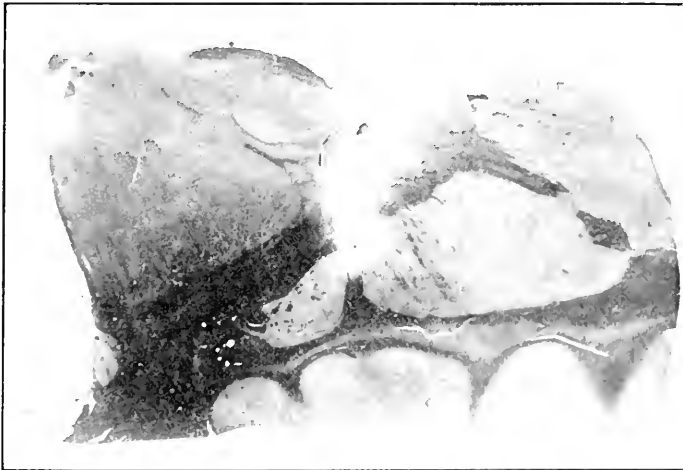


Fig. 7. Section taken a short distance below that represented in figure 6. The opto-striate fissure is much smaller. A bridge of tissue divides the opto-striate fissure into two parts.

large foramen of Monro. On the external surface of the pallium this thickening corresponds with the floor of the Sylvian fossa. . . . The subsequent partial separation of the corpus striatum into its two segments, the caudate and the lenticular nucleus, as well as the isolation of a thin peripheral cortical plate, the claustrum, is effected

by the subsequent ingrowth of the strands of fibers which later become the internal and external capsule."

"The posterior division of the fore-brain, the diencephalon, very early exhibits differentiation into an upper and a lower part. The former is the thalamencephalon. . . . The thalamencephalon is much the larger and gives rise to the bulky mass of the thalamus from its anterior two-thirds" (p. 1193).

It will be recognized from this description and from the accompanying cuts in the same book (Figs. 912 B, p. 1060 and 1030, p. 1192) that the corpus striatum and the optic thalamus in their development at first form two prominences separated by a deep groove, which gradually disappears as these two structures develop

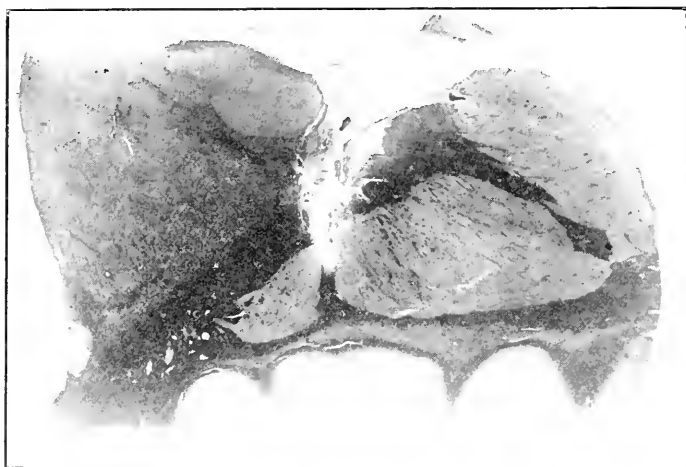


FIG. 8. The fifth section below the preceding. The opto-striate fissure has nearly closed, except for the small cavity extending slightly into the lenticular nucleus. A moderate amount of neuroglia proliferation is to be seen.

and come in intimate contact, leaving a slight indentation called by Dejerine *sillon opto-strié* (opto-striate notch) in the fully developed brain, as the only indication of this at one time prominent groove.

In E. N. the left hand, except the fingers and the left arm and forearm seemed to have normal motor power, but there was some deficiency in the movements of the left fingers. The child could not use his left fingers in a normal manner, he could not extend the left index finger alone and flex the other fingers of the left hand, but he could use the left fingers all together, *i. e.*, isolated movements of the fingers were imperfect.

The left upper limb was slightly spastic. Although the imperfection of movement was not noticed by the parents until the child was about four years old, it is reasonable to suppose that it existed from birth and was detected by the parents when the child reached an age at which more specialized movements would be expected. It is interesting to note that coördinated movement of the right upper limb was not perfect, as in the finger to nose test the child occasionally showed some dysmetria.

Extremely important is the fact that the child presented no disturbance of the left side of the face of sufficient importance to suggest to trained neurologists the necessity of searching for weakness of facial muscles. While he was not made to innervate each side of his face separately or together on command, there was no asymmetry observed in the face while he was at rest or speaking.

Both feet were deformed in a manner suggesting the deformity of Friedreich's ataxia, *i. e.*, the great toe was hyperextended at the first phalanx and flexed at the second. He had marked talipes equinus on the right side, and an indication of this condition on the



FIG. 9. Section a short distance below that represented in figure 8. The opto-striate fissure at this level has closed in entirely. The nerve fibers of the anterior part of the posterior limb of the internal capsule are lacking and their place is filled by neuroglia tissue. It is necessary to compare this figure with Fig. 6 in order to appreciate the extent of the defect in the anterior part of the posterior limb of the internal capsule.

left side. Sensation to touch was normal in both lower limbs. He was able to walk without great difficulty and had good power in his thigh muscles, but the motor power in the right peroneal and pos-

sibly right calf muscles was diminished. Extension and flexion of the right toes were weak although the extensor longus hallucis was strong. The lower limbs were not spastic.

It is difficult to explain such a condition as that described above



FIG. 16. Numerous spaces lined with ependymal cells found in the nervous tissue about the persistent opto-striate fissure, and comparable with those seen about the aqueduct of Sylvius or the central canal of the spinal cord.

with what is generally recognized as the function of the pyramidal tracts, when we realize that the anterior half of the posterior limb of the right internal capsule was absent. We are led to believe that the fibers from the face occupy the knee of the capsule, then follow

the fibers for the upper limb, possibly then the fibers for the trunk, and still further back the fibers for the lower limb. Sensory fibers, according to the views generally held, are posterior to the motor fibers in the inner capsule, even though they may form a break in the optic thalamus; but Dejerine teaches that sensory fibers are not isolated in the inner capsule and are intimately mingled with the motor fibers. According to the former teaching we can readily understand why sensation in E. N. was intact; but if the latter teaching is to be accepted we must assume that sufficient sensory fibers escaped in the inner capsule to innervate the left side of the body. This seems unreasonable as regards the sensory supply of the face. Otherwise we must conclude that the sensation of the left side, including that of the face, depended on the integrity of the left side of the brain, and it is indeed probable that sensation is more nearly represented for each side of the body in both sides of the brain.

The motor condition offers serious problems for elucidation. If the facial fibers are situated only in the knee of the capsule why was not at least the lower part of the left side of the face completely paralyzed? If the motor fibers for the upper limb are directly posterior to those for the face how could those fibers escape in the lesion of E. N. in the right internal capsule?

The moderate implication of the right upper limb, and the nearly equal implication of the lower limbs might be explained by the fact that the right internal capsule normally contains motor fibers for these parts and more nearly equally so for the lower limbs, and the disturbance of function in these parts might be attributed to the defect in the right internal capsule. We should expect that the movements of the toes would be especially impaired as these movements depend on highly specialized nerve fibers and nerve cells. We may explain the voluntary movements of the left upper limb, excepting the isolated movements of the fingers, on the assumption that the left upper limb in its grosser movements was supplied from the left side of the brain. Recent studies of voluntary motor function have thrown doubt on the views generally accepted regarding the function of the pyramidal tracts, and it is in place to review here some of the results published during the past few years.

Franz believes that there is not the definiteness of localization in the motor cortex which has been supposed. The fact that there is a variation in the extent of the leg or the arm area in different animals indicates that motor cells located in similar locations may send impulses in different directions. The fact that the stimulation of cer-

tain spatially located points in an area which usually gives rise to movements of the thigh may, for example, result in combined movements of the arm as well as of the thigh is also an indication of a complex mechanism. This becomes more evident when we realize that such combined movements are obtainable upon stimulation of the cortex of one animal and not when the cortex of another is stimulated (or if obtained in the second animal the combined movement differs in quality). His experiments on four monkeys of which both hemispheres were stimulated indicate that the connections which are established from the left motor cerebral hemisphere are considerably

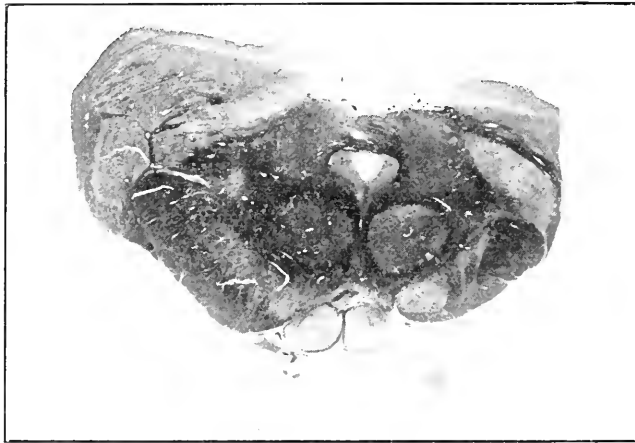


FIG. 11. The right pes pedunculi is much smaller than the left, especially so at the inner portion. It appears as though the fibers from the posterior part of the posterior limb of the internal capsule had spread out in the pes. The fasciculus of Türk is of normal size. No area of neuroglia proliferation is to be seen in the pes pedunculi.

greater than those established from the corresponding region of the right cerebral hemisphere. In all four of his monkeys of which both hemispheres were investigated and measured the stimuable areas on the left surpassed those on the right. The motor areas for the leg and arm segments he found to differ in size in the brains of different animals of the same species (monkeys).

Franz's results, in association with the data of others, indicate that the connections which are made by way of the cortical motor cells are not definite in the sense, for example, that there is passage of an impulse from a Betz cell in the anatomically defined cerebral motor region to another particular efferent cell in the spinal cord, but that the connection is promiscuous or irregular. The connections

which one particular efferent or afferent cell makes are connections with a great number of neurones, and the impulses resulting from the activity of a cell body may affect many other cells. An impulse arising in one cell may activate or influence only one, or any number of the cells which are anatomically associated with the particular



FIG. 12. The right anterior pyramid in the medulla oblongata is much smaller than the left. The right lemniscus also appears to be smaller than the left.

cell with which we deal. A certain cell has the possibility of sending its impulses along the main neuraxon, but as this neuraxon gives off, as it passes to its final goal, certain collaterals it has also the possibility of sending impulses along any one of these, or along the main neuraxon and any number of the collaterals, or along one or more of the collaterals to the exclusion of the main trunk.

Franz quotes Brown and Sherrington as having stated that repeated stimulation of the same center, or group of cells, did not always result in the production of the same quantity or grade of movement. Thus, the center which on the first stimulation gave the greatest amount of reaction might be found to give a less amount of reaction at another time, and the area which gave the small amount of flexion or extension at the time of the original or first experiment was sometimes found to give a greater amount of flexion or of extension in a second test.

The views of v. Monakow are very radical and surprising. He states that if in the cat, dog or *Macacus* the regio centralis (gyrus sigmoides, anterior and posterior central gyri) is destroyed, sec-

ondary degeneration occurs in the pyramidal tract but is never complete, at least a third of the fibers of this tract remains intact. The fibers which are affected are not all affected in the same way, in these animals or in man, some pyramidal fibers are reduced in size, some are degenerated and have lost their medullary sheaths and have shriveled axones, and others have entirely disappeared. If an entire cerebral hemisphere in the rabbit, cat or dog be destroyed then the entire pyramid of the same side degenerates completely. The processus reticularis of the opposite cervical region is also degenerated.

In man the anterior pyramid undergoes complete secondary degeneration usually only from extensive destruction of the cerebral hemisphere, implicating the projection fibers of the regio centralis and the lenticulo-optic part of the inner capsule, even the corpus striatum. If the lesion be confined to the superficial part of the gyri centrales, even in man, the secondary degeneration is incomplete and usually very incomplete in the anterior pyramid.

If the destruction of the cortex be confined to the lower two-thirds of the anterior central convolution, even of both central convolutions, *i. e.*, to the head and upper limb regions, and the lesion does not extend to the projection fibers and inner capsule the degeneration of the anterior pyramid is very slight. v. Monakow has found it less than when destruction had occurred in the extrarolandic cortex and the rolandic region had been left intact. Certainly the degeneration of the anterior pyramid after destruction of the upper limb and face centers is much less than that after destruction of the lower limb center (area gignanto-cellularis). He is certain that pyramidal tract fibers may atrophy after extensive cortical lesions which spare the regio rolandica and inner capsule, as a lesion of the frontal lobe or of the lower parietal lobe. He is certain that in one case he found ascending degeneration of the pyramidal tract as far as the inner capsule from a lesion in the medulla oblongata, and he is not speaking of the well known retrograde degeneration. There must be corticofugal as well as corticopetal fibers in the pyramidal tract. The pyramidal tract must have only a slight connection with the face and upper limb centers of the motor cortex, and far less than is indicated by movements of face and upper limb produced by irritation of these centers. He asserts that the majority of the corticofugal projection fibers arising in the middle and lower third of the central gyri do not go into the anterior pyramid, but by means of the corona radiata and inner capsule pass to the tegmentum in the regio subthalamica and midbrain. This conclusion seems to him

warranted by the recent investigation of Graham-Brown and Sherrington.

The lower limb center (*area giganto-cellularis*) especially gives origin to the pyramidal tract, and in a small degree the face and upper limb centers do also, but pyramidal fibers also arise probably in the frontal lobe and parietal lobe. He is uncertain whether pyramidal fibers arise in the corpus striatum.

He believes the importance of the upper limb center in the anterior central convolution is overestimated. In some cases where this region was almost completely destroyed, the patient could use the opposite hand remarkably well, although the movement was somewhat ataxic and slow. The brachial monoplegia from lesion of the middle portion of the anterior central gyrus in man is transitory. In the Orang-utan both the arm region and even the cortex adjoining may be removed without great loss of movement (Graham-Brown and Sherrington. Congress of Groningen 1913), although these animals show in each upper limb paretic phenomena. The upper limb center, he asserts, can not be the real source of the voluntary movements. He believes that the pyramidal tract has no important rôle in the successive development of the usual (specialized) differentiated movements (*Fertigkeitsbewegungen*), movements of skill; this tract is concerned more with reflex action than with synchronous specialized movements with the fingers. My case E. N. seems to contradict this, as the specialized movements of the left fingers were very imperfect.

Von Monakow says that what significance is to be attributed to the extrarolandic portion and the reticular portion of the pyramidal tract is unknown. After section of both anterior pyramids, even in the *Macacus*, the movements of the animal are not greatly impaired, and electrical irritation of the arm center may still produce contraction.

The upper limb center is richly supplied with corticopetal and corticofugal fibers, important for specialized movements. The fibers passing to the tegmentum of the midbrain are the more important for these movements, but for these movements the extrarolandic fibers also are important, pyramidal tract fibers as well as cortico-tegmental fibers.

Von Monakow states that the fibers for specialized movements pass to the tegmentum through the inner capsule. My case E. N. shows at least that they probably pass by the internal capsule, as specialized movements of the left fingers were very imperfect.

It is only by such views as those expressed by v. Monakow that I

am able to explain the escape of the left side of the face and moderate impairment of function in the left upper limb. If his view be correct that the pyramidal tract must have only a slight connection with the face and upper limb centers of the motor cortex, we can understand why defect of the anterior half of the posterior limb of the internal capsule caused so little impairment of voluntary motion.

BIBLIOGRAPHY

- Schlesinger, *Die Syringomyelie*, 1902, p. 150.
Spiller, *British Medical Journal*, Oct. 20, 1906.
Thielen, *Deutsche Zeitschrift für Nervenheilkunde*, Vol. 35, p. 391.
Spiller, *American Journal of the Medical Sciences*, July, 1902.
Spiller and Allen, *Journal of the American Medical Association*, April 13, 1907.
Human Anatomy, edited by Dr. George A. Piersol.
Franz, S. I., *Symptomatological Differences Associated with Similar Cerebral Lesions in the Insane, and Variations in Distribution of the Motor Centers*, Psychological Monograph, 1915; also Franz, Sheetz and Wilson, *Journal of the American Medical Association*, Dec. 18, 1915.
Brown and Sherrington, *Proceedings of the Royal Society*, 1912, B. 85.
v. Monakow, *Neurologisches Centralblatt*, April 13, 1915, p. 217.

ANOSMIA AND SELLAR DISTENSION AS MISLEADING SIGNS IN THE LOCALIZATION OF A CEREBRAL TUMOR¹

BY HARVEY CUSHING, M.D.

SURGEON-IN-CHIEF, THE PETER BENT BRIGHAM HOSPITAL, BOSTON

The process of making a regional diagnosis of a case of brain tumor consists in assembling, after a complete neurological examination, all of the positive signs and symptoms which may be of localizing value. To interpret correctly these positive findings it is important to discard from consideration all those which may be irrelevant or misleading—the so-called secondary distant or false localizing signs.

These misleading signs most often occur as more or less pronounced palsies of the cranial nerves due to their compression or distortion as the configuration of the brain is altered by the growth. It is true that a false localizing sign may occur with sufficient frequency in certain groups of cases as to make it of actual value, so that the distinction between true and false local manifestations is merely one of interpretation. A good example of this is the diplopia produced by weakness of one or both abducentes, which is of such common occurrence in cases of cerebellar tumor. This symptom may be due to a nuclear palsy or to direct involvement of the nerve by the growth, but is far more often produced, in my opinion, as has been recorded elsewhere,² by a strangulation of the nerves from the overlying posterior cerebellar arteries, which cut into them like rubber bands when the cerebellum is enlarged by the tumor. Diplopia, therefore, or an actual objective weakness of one or both external recti, commonly appears among the positive symptoms and signs of the patient's tumor and yet they are false or distant manifestations in so far as the direct involvement of the nerves by the tumor is concerned. In a similar fashion the internal carotid may indent the side of the chiasma, or its middle cerebral branches may affect the oculomotor nerves and produce false localizing signs which may be difficult of interpretation and confusing to the regional diagnosis.

¹ Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

² Cushing, H., Strangulation of the Nervi Abducentes by Lateral Branches of the Basilar Artery in Cases of Brain Tumor. *Brain*, 1910, XXXIII, 204.

In this communication special reference will be made to the secondary distension of the sella turcica and to anosmia, both of which are common accompaniments of interpeduncular tumors of pituitary origin and may therefore be signs of positive localizing value. In the case to be recorded, however, they will be shown to have been distant or false regional manifestations of the growth. In fact they so far outweighed in their definiteness the actual localizing signs of what subsequently was found to have been a removable tumor that the case was abandoned with a decompression alone.

SURG. NO. 1285. Large fibro-endothelioma of the left hemisphere. Tumor unlocalized. Right subtemporal decompression. Death after three months. Autopsy.

May 19, 1914.—Admission of Miss Mary M., aged 24, a cashier, with the complaint of headache and failing vision.

Family history negative. She has always enjoyed exceptional good health.

Present Illness.—Duration one year. Onset with headaches, chiefly suboccipital, for past six months, accompanied at times by vomiting. Considerable loss of weight. Failing vision for past month; rapid loss for two weeks; can now barely distinguish light. She complains of being constantly salivated. No history of trauma. No convulsions.

Patient is right-handed.

Examination negative except for the neurological findings. Wassermann negative.

Head.—Definite left suboccipital tenderness and head carried with a tilt toward the left shoulder. Some dilatation of surface vessels, especially of eyelids. Definite bilateral exophthalmos. No diplopia; no facial asymmetry. The X-ray shows a marked flattening of the floor of the sella turcica and destruction of the posterior clinoid processes and dorsum sellæ. (Fig. 1.)

Cranial Nerves.—I. Complete anosmia. II. A bilateral choked disc subsiding with cicatricial atrophy. Right, 2 D; left, 3.5 D. III, IV, VI. Left pupil slightly larger than right; reactions sluggish to light and accommodation. V. Slight hypesthesia on the right side of the face. VII. Slight facial asymmetry in smiling; left nasolabial fold deeper than right. VIII. Occasional tinnitus in the right ear and some lowering of air conduction there. XII. Tongue deviates slightly toward the right.

Cerebrum.—No symptoms made out referable to a lesion of frontal, temporal, occipital, parietal, or paracentral regions. Sensation normal. Stereognosis accurate. No motor twitchings. No subjective numbness. No aphasia. No apraxia. Deep reflexes equal throughout and in normal limits, though both plantar and the left corneal reflexes are sluggish. Slight relative weakness of right hand shown by dynamometer (right, 11; left, 28).

Cerebellum.—Positive Romberg with sensation of falling to the left. Suboccipital headaches and tenderness. No nystagmus. Ca-

loric tests negative. Slight incoördination of movements on right with deviation outward on Bárány finger-to-finger test.

The findings, in short, were those of pronounced general pressure phenomena. The anosmia and the sellar distortion, though looked upon with suspicion, were regarded as secondary changes due probably to a posterior lesion, possibly a right extracerebellar tumor,



FIG. 1. Showing obliteration of sellar outlines from complete absorption of the dorsum.

accounting for the suboccipital discomforts, the slight lowering of hearing with tinnitus and partial loss of sensation and movement in the right face. Though the symptoms in either case were unconvincing, the presumptive regional diagnosis lay between a subtentorial lesion and an interpeduncular one, though the choked disc and the absence of amenorrhea or other secondary pituitary manifestation spoke strongly against the latter.

The usual right subtemporal decompression as a temporizing measure for a tumor of obscure localization was advised, knowing that, should a secondary hydrocephalus be disclosed, the presumption of a posterior lesion would be strengthened.

May 22, 1914. Operation.—A right subtemporal decompression was performed and the ventricle punctured. Only 2 c.c. of fluid were secured. The brain was moderately tense. Closure in layers as usual without drainage.

Following the operation there was a marked subjective improvement with complete relief of headaches, a subsidence of the choked disc to 1.5 D., though vision was reduced to shadows. The slight weakness of the right side was no longer apparent, and she was discharged on *June 13*.

Her period of comparative relief was brief and she reentered the hospital after two weeks, with a return of headache and vomiting. At this time no additional symptoms of localizing value were elicited. There was possibly some slight weakness of the right face but it was not definite. She still showed a positive Romberg and deviated to the left on taking steps. The deep reflexes were sluggish but equally so, and there was a positive Babinski toe response to plantar stimulus on both sides.

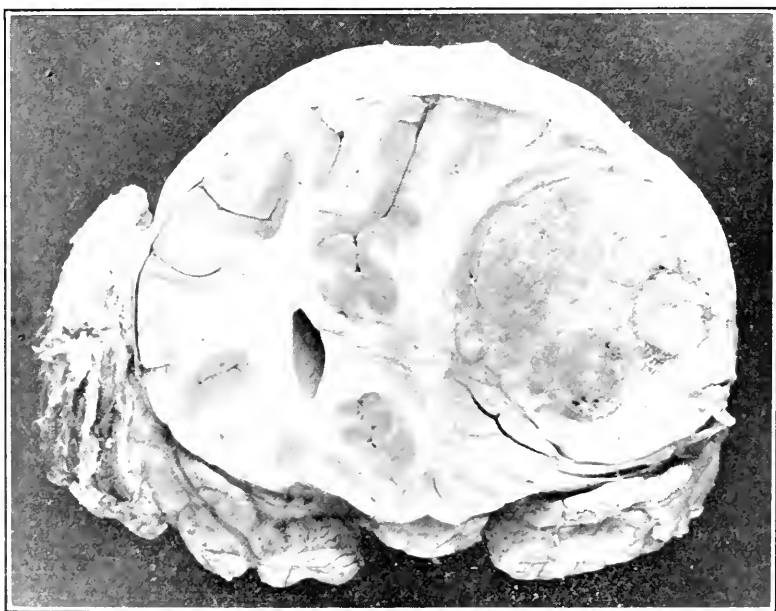


FIG. 2. Coronal section at the tip of the temporal lobes, showing the protrusion of the decompression on the right, the tumor on the left, with flattened ventricle and dislocation of the hemispheres.

She soon passed into a somnolent state and it is possible that there may have been aphasia before the end, for she would reply only in monosyllables, but it was thought that she was in an irresponsive state from her stupor. There certainly was no paralysis of the extremities.

She grew progressively more comatose and ultimately succumbed to a pneumonia on *August 15, 1914*.

Autopsy.—The brain was fixed *in situ* before removal. A large endothelioma of approximately 160-gram size was found on the left

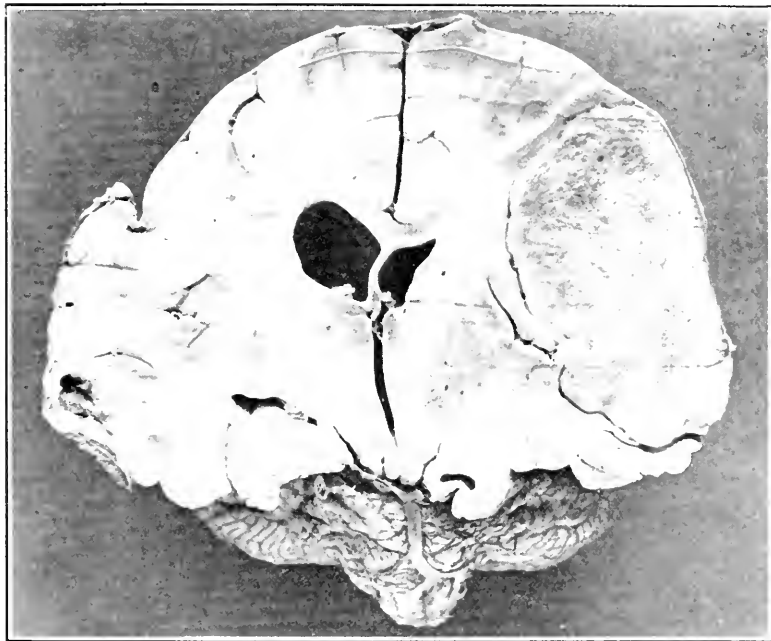


FIG. 3. Coronal section at a level just anterior to the pons through the center of the decompression on the right and the tumor on the left.

side, greatly displacing the hemisphere (cf. Figs. 2 and 3). There was some thinning of the overlying skull which possibly should have been recognized during life.

It is always remarkable to what an extent a slowly growing fibro-endothelioma may deform and indent the brain without serious loss of function. However, when a tumor of this kind overlies the motor area as it did in this patient, irritative symptoms of a Jacksonian type are apt to be elicited and are commonly followed by a palsy of the corresponding parts. This is particularly true of these tumors when they arise from the parasagittal region and primarily involve the foot centers. Had such a sequence occurred in the case of this unfortunate girl the location of the lesion would have been unmistakable.

It is a source of recurring astonishment that a tumor of this size can fail to completely throw out of function the subjacent com-

pressed cortex. Doubtless in the light of the post mortem findings the persistent slight deviation of the tongue to the right, and the slight weakness and numbness of the right face were enough to have justified an exploration or at least a decompression over the hemisphere, which in this case would have disclosed the lesion. However, the positive findings were interpreted as more suggestive of a lesion elsewhere, and of these findings those which concern us here are the anosmia and the sellar deformation.

The sella turcica, which was removed in a block (Fig. 4), shows

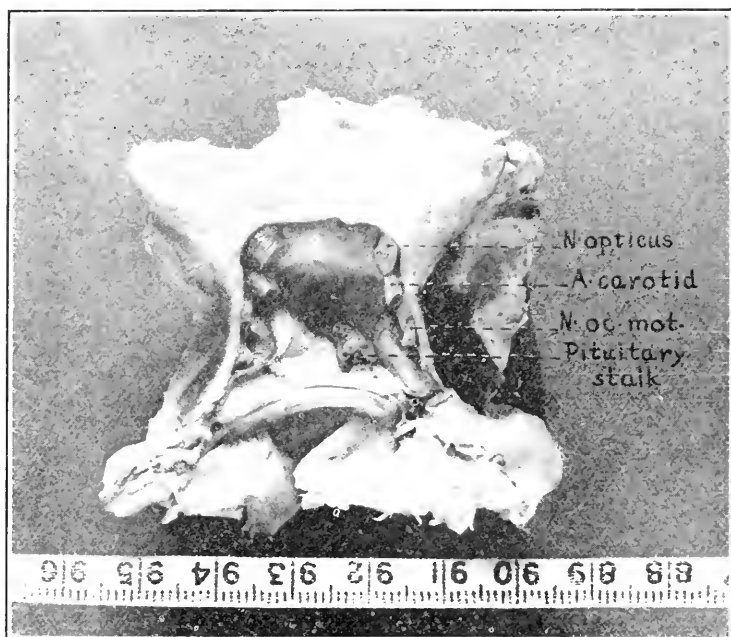


FIG. 4. The interclinoid region and pituitary fossa removed en bloc. Note the sharp dural margin between the anterior clinoid processes which had served to cut the olfactory tracts. The interpeduncular tissues had herniated into and moulded themselves in this distended interclinoid quadrilateral space (cf. Fig. 5).

not only a complete pressure absorption of the dorsum but a great widening of the entire space between the four clinoid processes. The dural margins which pass back from the anterior clinoid processes to merge into the incisura tentorii are separated 2 cm. anteriorly and 2.5 cm. posteriorly, and the dural covering of the widened and flattened sella is pressed downward fully a centimeter.

Into this cup-shaped quadrilateral space there has been crowded and molded the structures seen on the photograph of the base of

the brain (Fig. 5). They indeed represent a complete cast of this space. The dural edges connecting the four clinoid processes have cut deeply into the brain, sharply demarkating the distorted area. The herniation of the adjoining convolution from the left hemisphere

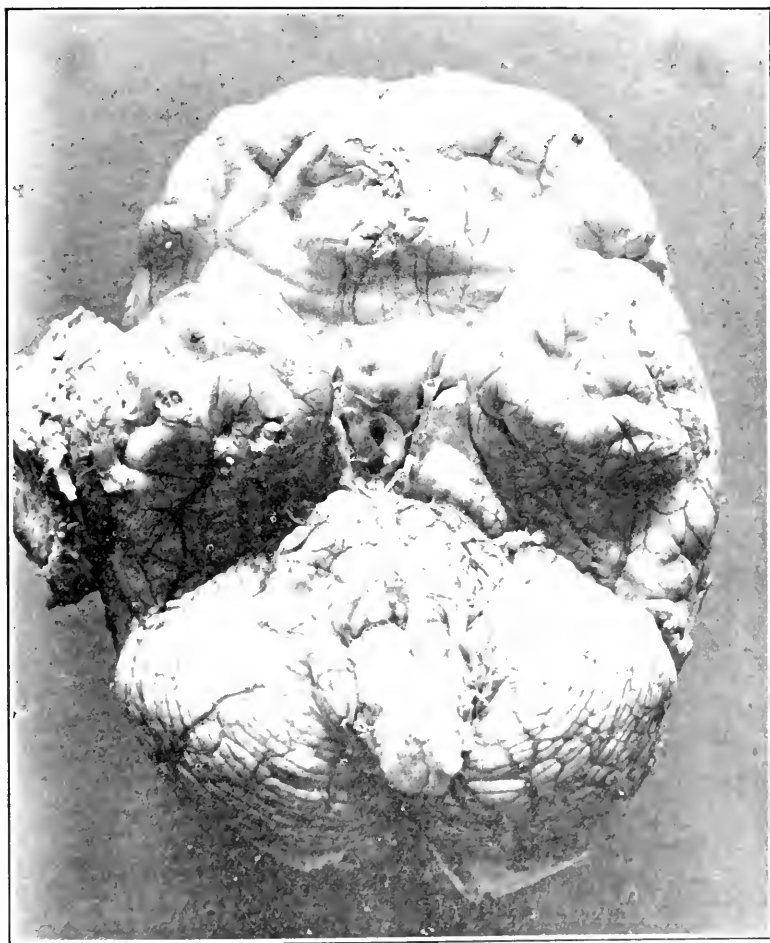


FIG. 5. Base of brain showing in the cast of the interpeduncular structures which had herniated into the distended interclinoidal space (cf. Fig. 4).

into this cup is particularly noticeable, almost all of the left caput gyri hippocampi having been squeezed into it. Anteriorly the posterior end of the gyri recti together with the olfactory tubercle and tuber cinereum have been crowded into the fossa and have pushed the chiasm downward under them and greatly flattened it. The

olfactory tract itself has therefore been bent at an acute angle around the sharp dural edge connecting the two anterior clinoid processes, and at this edge has been thinned to a mere ribbon.

Anosmia.—It is assumed, on the basis of this observation, that the anosmia in this case was attributable solely to this mechanical distortion of the olfactory tracts, which must have caused an effective block to all impulses. Whether or not this is the usual cause of the relative lowering of olfactory acuity in other cases of tumor with extreme tension cannot be told, but it at least is a possible one. A similar condition has been observed once before in the brain of a patient with a frontal tumor which showed a herniation of adjoining structure into the distended interclinoid space with a corresponding implication of the N. olfactorii. Needless to say, the moulding of the parts which takes place under these circumstances can only be perpetuated post mortem provided the brain is thoroughly hardened by intracarotid injections of a fixative before its removal.

It has long been recognized that a relative blunting of the olfactory sense is a common accompaniment of the general pressure phenomena of tumors. It is supposed to be particularly true of tumors of the posterior fossa, the relative anosmia of these cases being ascribed by Oppenheim to the dilatation of the third ventricle, resulting in pressure against the olfactory centers or tracts. Such a condition would necessarily be associated with a high grade of choked disc, and some have attempted to explain the lowered sense of smell to an analogous process—namely, to a choked olfactory bulb, just as a blunted sense of hearing has been attributed to a choked labyrinth. There has been no anatomical proof of these conditions and they are thus purely speculative.

In Grey's analysis³ of our series of posterior lesions only three out of fifty-eight cases showed a complete anosmia, and this accompanied in all cases a high grade of pressure. In some other cases there was a subjective blunting of the sense and in one or two the disturbance was limited to one side, and olfactory hallucinations were occasionally observed.

It must be remembered, of course, that many persons possess a very low olfactory sense discrimination and in none of these patients was it possible to make comparative observations. It should be borne in mind, too, that a unilateral or even a complete anosmia may be a true localizing sign of frontal lobe tumors or of basal growths originating in the pituitary neighborhood. For this reason the combination of a marked sellar distortion with loss of the sense of

³ Grey, E. G., Studies on the Localization of Cerebellar Tumors.—V. The Cranial Nerves. The Johns Hopkins Bulletin, 1916, XXVI, 251.

smell was one of the sources of some diagnostic confusion in the case under consideration.

Secondary Sellar Distortion.—The secondary enlargement of the sella turcica produced by distant lesions was formerly misinterpreted on many occasions, but with our present increased familiarity with the various types of deformation of the fossa it is rarely mistaken for the enlargements from a local tumor.

A widening of the cup with more or less absorption of the dorsum often accompanies marked states of increased intracranial pressure and is particularly common with cerebellar lesions which have caused an obstructive ventricular hydrops. Under these circumstances, of course, there will be a high grade of choked disc and this combination of symptoms in the case under discussion was partly responsible for our early belief that there was a posterior lesion—a belief which was disproved by the failure to find a dilated ventricle when the decompression was done.

Conclusion.—In a large neurological clinic in which material is carefully analyzed, every case has points of interest, but those in which mistakes of diagnosis have been made are apt to be the most instructive of all. And so from this history the lesson is learned that anosmia may apparently be produced by a mechanical injury resulting in acute angulation of the olfactory tracts brought about by a herniation of the superjacent structures into a greatly distended interclinoidal space caused by pressure absorption of the pituitary fossa.

ON THE DIAGNOSIS OF SUBACUTE COMBINED SCLEROSIS OF THE SPINAL CORD ASSO- CIATED WITH SEVERE ANEMIA*

BY WILLIAMS B. CADWALADER, M.D.

INSTRUCTOR OF NEUROLOGY AND NEUROPATHOLOGY AT THE UNIVERSITY OF PENN-
SYLVANIA; CLINICAL ASSISTANT TO THE PHILADELPHIA ORTHOPEDIC
HOSPITAL AND INFIRMARY FOR NERVOUS DISEASES.

(From the Laboratory of Neuropathology of the University of Pennsylvania.)

In 1913 Dejerine published an article in which he called attention to a certain type of sensory dissociation observed by him in three cases of posterolateral sclerosis of the spinal cord, one of the cases coming to autopsy.

This type of combined sclerosis runs a subacute course and has its origin in an infection or a toxic process, the nature of which has not as yet been definitely determined, or it is referable to pernicious anemia. The condition is identical with that first described by Dana and Putnam in this country, and later by Russell, Batten, and Collier in England. Additional cases have more recently been reported by Dejerine and Jumentie,¹ Dejerine and Mouzon,² Riley,³ Shimazono,⁴ Barnes,⁵ and Foster Kennedy.⁶ As Dejerine has shown in this disease the degeneration of the posterior columns is peculiar in that it begins in the more medianly situated fibers, that is to say, in the long fibers of the posterior columns, or Goll's columns, and in the parts adjacent to Burdach's columns. Consequently in the early stages deep sensation alone is disturbed, more particularly bone sensation and the sense of muscular position.

I have recorded here the notes of the histories and the results of examination of nine cases that I believe conform to the type of combined sclerosis of the spinal cord associated with anemia. For the sake of brevity the negative findings have been omitted. Five of the cases studied were in the service of Dr. William G.

* Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

¹ Rev. Neurol., 1914, XXII, 271.

² Rev. Neurol., 1914-15, XXII, 207.

³ Journal Michigan State Med. Soc., 1914, XIII, 718.

⁴ Arch. f. Psychiat., 1914, LIII, 972.

⁵ Jour. Missouri State Medical Asso., 1913-14, X, 452.

⁶ Medical Record, 1913, XXXIV, 84.

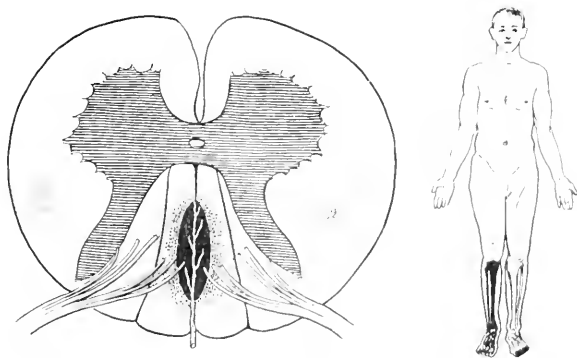
Spiller, at the hospital of the University of Pennsylvania, one was seen in the service of Dr. John K. Mitchell at the Orthopedic Hospital and Infirmary for Nervous Diseases in Philadelphia, another was in the service of Dr. Francis W. Sinkler in the same institution, and one occurred in my own service at the Presbyterian Hospital.

In each of these cases more or less disturbance of voluntary motor power of the lower extremities, with ataxia and moderate spasticity, was observed. The tendon reflexes were exaggerated, and in all but one (Case III) the presence of a typical Babinski sign was demonstrated. Two types of sensory phenomena were recorded, subjective and objective. The patients all complained of subjective disturbances of sensation, variously described as numbness, burning, tingling, coldness, and heaviness of the lower extremities or of the hands.

Examination showed that tactile sensation and sensations for heat, cold, and pain were normal in all but one case (Case VIII).

Bone sensation, as tested by the appreciation of the vibrations of a tuning-fork, was lost or modified in the lower limbs in every case. The inability to recognize posture of the toes, associated with diminished appreciation of passive movements of the toes or fingers, was present in all cases.

In cases presenting "the syndrome of the long root fibers of the spinal cord," unlike tabes, the superficial sensations, especially the tactile sensation, remain intact. The integrity of the superficial sensibility, as well as the sensory changes noted in syphilitic cases, is due to the method of localization of the lesions in the



In combined sclerosis of the spinal cord associated with pernicious anemia the degeneration of the posterior columns is peculiar in that it begins in the more medianly situated fibers, that is to say, in the long fibers of the posterior columns, or Goll's columns, and in the parts adjacent to Burdach's columns. Consequently, in the early stages, deep sensation alone is disturbed, more particularly bone sensation and the sense of muscular position.

posterior columns. (See diagram.) In the subacute type of combined sclerosis of the posterior columns associated with severe anemia the sclerosis does not originate in the nerve-roots, as is so commonly the case in syphilis, since the roots and the posterior horns are found intact. The posterior, like the lateral, columns are attacked directly by an infectious or a toxic process; this process is endogenous, whereas in syphilis the posterior roots are affected early. The more laterally situated fibers on the external part of Burdach's column may not be affected until late in the course of the disease, or they may escape entirely. In April, 1916, Dr. Wm. G. Spiller reported to the Philadelphia Neurological Society the microscopic findings of the spinal cord in a case of tabes associated with severe anemia. He was able to demonstrate not only the usual lesions of tabes dorsalis but also the characteristic alterations of the spinal cord associated with anemia.

We know today that the various deep sensations and stereognostic perceptions are represented only in the long fibers of the posterior columns, and it is the long fiber system alone that is involved in this type of combined sclerosis. It is clear, therefore, that by applying these known pathologic and physiologic facts it is possible, in most cases, accurately to determine the location and extent of the sclerosis when it occurs within the posterior columns, and, by determining the location and extent of the sclerosis, a positive opinion as to the nature of the condition that has produced it can be given.

Bramwell,⁷ in discussing pernicious anemia and its relation to combined degeneration of the spinal cord, coincides with the view expressed by Collier,⁸ that the anemia and spinal lesions are due to a common factor—probably one or several different toxins—but he seems inclined to disagree with Nonne, who suggests that the cord lesions are due to vascular changes brought about by the anemia. Bramwell believes that the anemia may precede, follow, or be coincidental with the symptoms of the spinal cord lesions, showing that these latter are in no way dependent upon the severity of the anemia. This is a fact of the greatest importance. I have seen cases in which the characteristic signs of degeneration of the long fibers of the posterior columns of the spinal cord were present, and yet the blood showed no alteration, or the latter was of so mild a degree as hardly to justify even the slightest suspicion that pernicious anemia might have been the causative factor in its production. As an example may be cited Case III. Here the blood picture showed:

⁷ *Edinburgh Medical Journal*, 1915, XIV, p. 260.

⁸ In Allbutt and Rolleston's *System of Medicine*.

Hemoglobin	56 per cent.	Neutrophiles	66 per cent.
Erythrocytes	4,660,000	Lymphocytes	25
Leukocytes	10,600	Large mononuclears ...	3
		Transitional cells	4
		Eosinophiles	2
		No nucleated red cells	
		No macrocytes	

Nevertheless in spite of this finding, the profound loss of bone sensation in both lower limbs, extending as high as the second dorsal vertebra, strongly suggested that the long fibers of the posterior columns were disturbed.

Bramwell refers to a case in which the symptoms suggested disseminated sclerosis; the blood count two weeks before death showed no characteristic features of pernicious anemia. At that date the blood count showed: 4,200,000 erythrocytes, 70 per cent. of hemoglobin and a color index of 0.8. During the following fortnight, without obvious cause, a very rapid deterioration of the blood took place, and the stage of rigidity passed into the stage of flaccidity. The erythrocytes numbered 600,000; hemoglobin 28 per cent., and the color index, 2.3. The patient died two days later. In this case there had been no marked anemia for three years, although nervous symptoms due to combined sclerosis of the spinal cord had been present. The diagnosis was confirmed at autopsy.

That remissions may occur in pernicious anemia is well known. Thus there may be almost complete recovery, although this is but temporary. During this stage the blood count may show little or no abnormality on which to base an opinion that severe anemia has previously been active; nevertheless, if, associated with the anemia, alterations of the spinal cord have taken place, there would remain the characteristic alterations of objective sensation with ataxia. As a good example of this type may be mentioned Case IV. This patient was known to have had an attack resembling pernicious anemia in 1914. At this time, or shortly after, he developed the usual signs of combined sclerosis of the spinal cord. When seen in 1916 the alterations of sensation conformed to the type of combined sclerosis under discussion, although severe anemia was not present at this time. The blood count showed: hemoglobin 48 per cent.; erythrocytes 3,220,000; leukocytes 6,200.

This case illustrates that, merely because of the character of the spinal cord symptoms, a former attack of severe anemia should be suspected, and a subsequent fatal attack of anemia is to be anticipated. Persistent alterations of the spinal cord do not seem to be associated with anemia other than the pernicious variety.

Bramwell in the article already referred to says further: "The rapid passage of the ataxic spastic stage of the disease, with increase of the deep reflexes, into the flaccid stage with complete paraplegia, muscular atrophy, and abolition of deep reflexes, has not, so far as I know, been satisfactorily explained by any post-mortem findings. No pathologic changes in the anterior cornua, anterior nerve roots, or motor peripheral nerves have, so far as I know, been found to explain this condition."

From what has been said it is clear that, because of the fact that the alterations of the spinal cord associated with anemia are the result of an endogenous process of a toxic character, and also because in the beginning the process is limited to the fibers situated close to the midline of the posterior column and to the crossed pyramidal tracts, the clinical picture will be that of a combined sclerosis in which ataxia, spasticity, and increased tendon reflexes are the conspicuous features. This is the condition to which Bramwell refers as the "ataxic-spastic or spastic stage" of the disease. It is also evident that if this pathologic process subsequently progresses, it must spread laterally toward the posterior horns of either side, destroying successively some of the tactile fibers and then possibly some of the fibers for pain and temperature, which are arranged close to the posterior horns; next the fibers that form the reflex arc and the tendon reflexes will disappear and the spasticity will diminish. This would seem to be a complete explanation of Bramwell's inquiry.

Case V serves as a good illustration. In September, 1915, the tendon reflexes were definitely exaggerated. In addition to the sensory phenomena and ataxia there was a tendency to spasticity of the lower limbs, with increased tendon reflexes, but after 7 months' time the tendon reflexes disappeared entirely.

In the early stages of combined sclerosis of the spinal cord with suspected pernicious anemia there are alterations in the deep reflexes of the lower extremities, particularly the bone sensation, as tested by the vibrations of the tuning-fork; ataxia and the inability to recognize posture of the toes, associated with diminished appreciation of passive movements of the toes or fingers are also present.

So far as I have observed, these particular sensory phenomena do not occur as isolated signs of syphilitic disease, but are associated sooner or later with a type of anemia that is fatal.

Preservation of pain and tactile sensation and increased tendon reflexes are the rule in the early stages of combined sclerosis associated with anemia. These sensations may, however, be affected

late in the course of the disease, with diminution or loss of the tendon reflexes. In cases of syphilis or tabes in which the posterior columns are affected, the sensory phenomena make their appearance in exactly the reverse order.

Even though the blood-picture of pernicious anemia is absent, the presence of the characteristic sensory phenomena is strong evidence that a fatal anemia may subsequently develop.

Whenever an elderly person complains continually of numbness, coldness, and tingling of fingers and toes, he should be carefully examined for objective alterations of sensation.

CASE I. Mrs. B. P. D., aged forty-eight, came under observation December 3, 1914. Three years before she noticed a numbness in the right leg and toes, which gradually extended to the knee. Two years later a similar condition developed in the left leg. During the last year the hands and forearm became numb, and she had difficulty in sewing and writing. About a year ago the lower limbs grew weak, she staggered, and gradually became too weak to walk. The patient's skin was of a peculiar greenish color, and she appeared to be very anemic. The right lower limb was a little weaker than the left, and the right patellar reflex was almost lost, whereas the left was exaggerated and there was patellar clonus. The Achilles reflex was lost on both sides. Touch sensation was distinctly impaired in the left leg below the knee. Pain and temperature sensations were normal in both legs as well as in the upper extremities. The sense of position was markedly impaired in the right toes, and somewhat less in the left toes. The Babinski reflex was typical on the left side, and distinct, but not so typical on the right side probably owing to the fact that the reflex arc was affected. The grasp of the hands was impaired. The blood count showed: Hemoglobin, 47 per cent.; erythrocytes, 2,560,000; leukocytes, 7,800. The differential count showed polynuclears, 73; lymphocytes, 20; large mononuclears, 2; nucleated red cells, 1; anicytosis, macrocytosis, and microcytosis were demonstrable.

The patient died February 2, 1915.

CASE II. Mrs. H. In September, 1914, the patient complained of tingling in the feet and hands. Blood examination showed: Hemoglobin, 70 per cent.; erythrocytes, 2,657,000; no poikilocytosis; no large red cells, all being uniform in size and no nucleated red cells. The patient could not control the movements of her feet, and staggered in walking. She had no pain, but a dull, numb feeling. There had previously been some pain in the hands, but this had disappeared. There was no jerking of the limbs. The patient would drop a thimble without being aware of it. The numbness was more pronounced in the toes than in the fingers. The skin of the face was slightly yellow. Biceps and triceps reflexes, as well as the wrist reflexes, were all normal. Finger to nose and finger to finger tests disclosed marked ataxia. Adiadochokinesis fair. Stereognosis,

the sense of passive movement, and that of position were good. Touch, pain, heat and cold, and vibratory sensation in the upper limbs and hands were good. Knee-jerks somewhat exaggerated. Achilles reflex normal. Touch and pain sensations normal in lower limbs, but sense of position was lost in the toes of both feet. Vibratory sensation was lost from the knees down. Babinski elicited upward movement of each big toe. Touch and pain sensations normal in feet and legs. Two points two inches apart in the legs and feet were not recognized. There was some weakness of the lower limbs.

CASE III. C. R., aged thirty-seven, female, married, was admitted to the nervous ward of the University Hospital on December 2, 1915, and discharged December 19, 1915. Her chief complaint was of pain in the small of the back and of a feeling of weight in the legs. In her own words, "she had no spring to the legs, but seems tied up in them." The palms of the hands felt numb. The legs were weak and the patient believed that she did not have full control of her body from the waist down.

The Wassermann reaction was negative for the blood serum. On lumbar puncture a clear fluid was obtained under normal pressure; only two lymphocytes were present.

Examination two days after admission showed a well-developed, well-nourished woman. Grip was good in both hands. The biceps and triceps tendon reflexes were normal and equal on both sides. The lower extremities were well developed. The patellar tendon reflexes were normal and equal on both sides, as were also the Achilles tendon reflexes. The liver and spleen were not palpable, and there was no Babinski reflex. Dysmetria in "finger-to-nose" test, as well as adiadochokinesis was absent. Stereognosis was good, as was also sensation to touch, pain, heat, and cold.

The urine examination was negative.

The blood examination showed on admission: Hemoglobin, 58 per cent.; erythrocytes, 4,660,000; leukocytes, 10,600. Differential count: Neutrophils, 66; lymphocytes, 25; large mononuclears, 3; transitionals, 4; eosinophiles, 2.

A careful test with the tuning-fork showed complete loss of vibratory sensation in the lower limbs and pelvis. In testing successive vertebrae it was found that vibration was recognized from above downward until the fork was placed at about the midlumbar region. The sensation in these lower vertebrae apparently was not so sharp as in the thoracic vertebrae. Vibratory sensation was quite acute over all the ribs, even the lowest. A positive Babinski could not be elicited in either foot on repeated examinations.

CASE IV. F. K., male, was admitted to the Orthopedic Hospital and Infirmary for Nervous Disease in the service of Dr. Sinkler on November 26, 1914, complaining of general weakness. His family history and his previous medical history were negative. He denied venereal infection. The patient complained greatly of gas in the stomach after eating. During the past two weeks he has lost twenty-five pounds, his present weight being 205 pounds.

Physical examination showed a large, stout man. The skin was dusky yellow in color. The mucous membranes are pale, and suggest anemia. The upper extremities are normal. The heart is normal in size; the sounds are regular, and there is a soft systolic murmur at the apex which is not transmitted. The other organs of the thorax and abdomen are apparently normal. His station is good; there is no ataxia, nor is there distinct objective loss of muscular power of the lower limbs. The tendon reflexes are equal and active on both sides. There is no Babinski sign, and no abnormalities of sensation were discovered. The urine examination and the Wassermann test were negative.

The blood examination November 28, 1914, showed: Hemoglobin, 22 per cent.; erythrocytes, 1,320,000; leukocytes, 3,680. Differential count showed: Polymorphonuclear cells, 3.75; mononuclear cells, 60.00; transitional cells, 2.0; eosinophile, 1.5; many nucleated red cells.

The patient improved considerably and was discharged at his own request.

He was examined again in January, 1916, and his blood count showed: Hemoglobin, 48 per cent.; erythrocytes, 3,220,000; leukocytes 6,200.

He stated that during the past year his legs had been growing weak and that he experienced some difficulty in walking. On examination it was found that he was moderately ataxic.

The muscular power of the lower limbs was somewhat impaired and there was a tendency to spasticity. The tendon reflexes were equal and exaggerated. On the left side there was a typical Babinski sign, but this could not be demonstrated on the right side. There was no ankle clonus. The sense of position in the toes of the left foot was abolished; in the right foot it was greatly impaired but not entirely lost. He could not recognize the vibration of a tuning-fork when it was placed on any of the bones of either leg. Sensations of touch, pain, heat, and cold were normal.

CASE V. Mrs. N., aged fifty-two, was admitted to the Orthopedic Hospital and Infirmary for Nervous Diseases in the service of Dr. John K. Mitchell in November, 1915. Her present illness began about September, 1915, when she first noticed that she was gradually growing weaker and weaker. From the beginning there was a feeling of numbness or "deadness" in her hands and feet, so that the finer movements, such as threading a needle or sewing, have been difficult to perform. She also complained of a feeling of uncertainty while walking.

Physical examination: Patient appears well-nourished, but is exceedingly pale. The heart-sounds lacked normal muscular quality, and there is a distinct systolic murmur at the base. The other thoracic and abdominal organs seem normal. The upper extremities show no loss of muscular power, and the tendon reflexes are equal and normal. There are no tremors, ataxia, or objective sensory disturbances, although the patient continually complains of

a subjective sensation described as numbness in the fingers. Sense of muscular position in the fingers and hands is normal. Bone sensation, as tested by the tuning-fork, is normal in the upper extremities; in the lower extremities the vibrations could not be recognized. Station shows considerable swaying. On walking, the patient is distinctly ataxic, and the lower limbs are weak. The knee-jerks are equal and moderately increased. There is no ankle clonus, but on plantar irritation, there is an upward movement of the great toe on the left side. This was absent on the right side. The sense of muscular position of the toes in the left foot is greatly impaired; in fact, the patient does not often answer correctly. This is also true of the right side, although here the impairment is milder. Sensations for pain, heat, cold, and touch were everywhere normal. The blood pressure test showed: Systolic, 170; diastolic, 80. Blood examination: Hemoglobin, 60 per cent.; erythrocytes, 2,520,000; leukocytes, 10,100. The red cells were very large in size; few nucleated red cells were found. Polymorphonuclears, 32; lymphocytes, 55; mononuclears, 5; transitionals, 8. The Wassermann reaction was negative in the blood-serum.

In March, 1916, the patient's condition was considerably worse. The ataxia was more marked; the knee-jerks could not be elicited, even with reinforcement; the Babinski sign was distinct on the left side; the sense of muscular position was entirely lost on the left, and seemed to be more markedly affected in the toes of the right foot. Bone sensation in the lower limbs remained unchanged, but some impairment was also present in the upper extremities. Sensations for touch, heat, cold and pain were not affected, but the patient seemed to be somewhat confused when the lower limbs below the knees were tested.

CASE VI. M. C., aged fifty, white, married, American, was admitted to the University Hospital August 31, 1915. Her chief complaint was of loss of power in both legs below the knees. Six months prior to admission there was stiffness of both ankles which progressed until now both legs below the knees are very weak. Pain was absent. She had a tingling and burning sensation in both feet, and declared that her legs often "jumped." She could walk only with the aid of a cane and only with great difficulty. If she walked in the dark she always fell. Acute pain, cough, headache, edema of the ankles, and gastro-intestinal disturbances were all absent.

Blood count showed: Hemoglobin, 74 per cent.; erythrocytes, 3,960,000; leukocytes, 8,800. Differential count: Polymorphonuclears, 68; lymphocytes, 21; large mononuclears, 6; transitionals, 2; eosinophiles, 3.

Wassermann test was negative in the blood-serum, and the spinal fluid was also negative.

She was almost unable to stand, and rose with great difficulty, and only after several attempts had been made. There was a distinct Romberg sign. Flexion of the thigh on the trunk was well performed. Crossing the left over the knee of the right leg was

less well accomplished than the same movements of the other leg. Extension and flexion of the leg at the knee-joint were weak, but at the ankle these were correctly done. Anterior tibial and peroneal movements were performed normally; that is to say, they were well done so long as the patient could keep visual control of the movements. Knee-jerks were present, more marked on the right than on the left. The Achilles jerk was not elicited. Bilateral Babinski sign was present.

The blood count one month after admission showed: Hemoglobin, 66 per cent.; erythrocytes, 4,140,000; leukocytes, 11,800. Differential count: Neutrophiles, 80; lymphocytes, 15; large mononuclears, 3; transitionals, 1; eosinophiles, 1. Two months after admission the blood count showed: Hemoglobin, 67 per cent.; erythrocytes, 3,600,000; leukocytes, 9,200. Differential count: Neutrophiles, 57; lymphocytes, 36; large mononuclears, 5; transitionals, 2; anisocytosis was present in mild degree; poikilocytosis was present but not marked; no nucleated red cells; no polychromatophilia, and no basic degeneration noted.

Two months after admission the patient could detect the difference in temperature between blowing and breathing on the left foot. Tactile and pain sensations were entirely normal in the left foot and leg. Sensations of position and passive movements were greatly impaired in the left toes. The points of a compass even when only two inches apart were not accurately recognized in either leg or foot, but they were almost correctly recognized in the hand. Heat and cold perception were good throughout the body. Tactile and pain sensations were normal in the right foot and leg. Sensation of position and passive movements were greatly impaired in the right toes. The test with the tuning-fork showed quick perception of the vibration in the hands and upper limbs, but not at all in the lower limbs, tested as high as the knees.

Three months after admission the blood count showed: Hemoglobin, 63 per cent.; erythrocytes, 3,430,000; leukocytes, 9,200. Differential count: Neutrophiles, 50; lymphocytes, 42; large mononuclears, 4; transitionals, 3; eosinophiles, 1; basophiles, 0; myelocytes, 0; polychromatophilia, +, rare; poikilocytosis, +, very slight; anisocytosis, +, very slight; nucleated red cells, 0; basic degeneration, 0.

The patient stated that she had never had pain, but that there was marked burning in the ankles and knees.

The fragility test showed that hemolysis began at 0.4, and was complete at 0.3. Urobilin in feces, 1,800 (lower than normal). The patient showed a low urobilin output. While this is a possible finding in the intermission of pernicious anemia, it is very unusual for the urobilin to reach so low an output in this condition. The findings would probably suggest diminished blood-cell formation incident to senile changes in the bone-marrow.

CASE VII. Mrs. M. C., aged sixty-two, was admitted to the University Hospital November 2, 1915, and discharged November 22, 1915, slightly improved.

The patient's chief complaint was of loss of power in her limbs, and of numbness from the waist down and in her arms. In May, 1915, the first toe on the left foot and the corresponding toe on the right foot felt as if they were "asleep," and a similar feeling developed in the index finger on each hand. This numbness spread gradually upward, so that now both lower limbs from the waist down are numb. A similar numbness affects her arms. Simultaneously her legs became powerless and she could not walk. Her arms were also affected. She was helpless for four weeks. Later power returned to her lower limbs and then her arms grew stronger. The left arm showed more improvement than the right. She had no pain whatever and was not sick. She was troubled with gas, and was inclined to be constipated.

Physical examination showed a fairly well-nourished woman, with slightly pale skin and lips of good color. The biceps and triceps tendon reflexes in both arms were normal and equal. There was no dysmetria in the "finger-to-nose" test. The patellar tendon reflexes on both sides were normal. The Achilles tendon reflexes were normal and equal on both sides. Both Babinski and Romberg signs were absent. Her gait was slow, but steady. Sensation to touch and pain was unimpaired. Careful testing with moderate degree of movement of the big toe on each side showed a distinct diminution of the sense of position and passive movements. Tactile and pain, and heat and cold sensations appeared to be normal in both feet and hands. Vibratory sensation seemed to be normal in the hands and elbows, but was absent in the lower limbs tested as high as the knees. The blood count showed: Hemoglobin, 50 per cent.; erythrocytes, 2,620,000; leukocytes, 6,400. Differential count: Neutrophils, 65; lymphocytes, 27; large mononuclears, 2; transitionals, 5; eosinophiles, 1; polychromatophilia, 0; anisocytosis, +; poikilocytosis, ++; nucleated red cells, 0; basophilic degeneration, 0.

CASE VIII. J. McG., aged forty-five, male, was admitted to the University Hospital October 20, 1914, and discharged June 25, 1915.

His chief complaint was of weakness in the legs and a loss of sensation in the fingers. Seven weeks previous to admission he had retired at night apparently well, but the next morning he noticed weakness in the legs and arms and a loss of sensation in his hands. The onset was sudden, and on attempting to stand he fell over. He could walk on a level surface but could not walk downstairs. On walking at night he staggered. During the daytime, he could walk only with the aid of a cane. From the beginning he had a sensation of numbness and coldness in his feet, and a tingling sensation in his fingers that extended up to the wrist.

Physical examination showed a thin, emaciated man of good bony frame. The upper extremities were well-developed with muscles slightly atrophied. The triceps jerks were normal and equal. There was some ataxia in both the arms in the "finger-to-nose" test. Sensation over irregular areas of the arms was uncertain for heat, pin prick, and touch. The patient appeared to be confused and said that touch was present when it was not. The knee-jerks on both sides

were increased. Babinski sign was present on both sides. There was no ankle clonus or exaggeration of the Achilles jerk. There was some loss of heat sensation on the dorsum of the foot. When the hands were tested there was one day a loss of sensation for heat, but on the following day, when the tubes were grasped firmly, the patient could differentiate distinctly. Deep touch sensation was everywhere intact. His station showed distinct Romberg phenomenon, due probably to weakness. The gait was ataxic, but the patient seemed inclined to drag the right toes on the floor as he walked. The blood count showed: Hemoglobin, 50 per cent.; erythrocytes, 2,930,000; leukocytes, 8,100. Differential count: Neutrophiles, 72; lymphocytes, 25; mononuclears, 1; transitionals, 1; eosinophiles, 1.

The Wassermann test was negative in the blood-serum. Sensation in the hands did not seem to be impaired. No cremasteric reflex was obtained. Over an area on the abdomen four inches in width sensation for heat and cold seemed to be normal. Pain sensation was somewhat diminished, whereas tactile sensation seemed normal. One month after admission the blood count showed: Hemoglobin, 41 per cent.; erythrocytes, 2,270,000; leukocytes, 6,000. Differential count: Polymorphonuclears, 60; lymphocytes, 29; mononuclears, 2; pale anisocytosis; slight poikilocytosis.

Three months after admission the blood count showed: Hemoglobin, 30 per cent.; erythrocytes, 1,400,000; leukocytes, 5,600. Differential count: Polymorphonuclears, 60; lymphocytes, 39; mononuclears, 1; anisocytes, +; poikilocytes, +; nucleated reds, 0.

In March, 1915, examination showed that the sense of position appeared to be lost in the toes of both feet, and that tactile sensation was uncertain. Pin-prick, heat, and cold in the feet and hands were probably recognized. The tuning-fork showed that bone sensation in the head was normal, slightly impaired in the upper extremities, and markedly impaired in the lower extremities, especially the left.

A blood examination made March 15, 1915, showed: Hemoglobin, 25 per cent.; erythrocytes, 1,180,000; leukocytes, 4,200. Differential count showed: Polymorphonuclears, 62; lymphocytes, 27; mononuclears, 5; transitionals, 4; eosinophiles, 1; basophiles, 1; polychromophilia, —; anisocytosis, +; poikilocytosis, +; nucleated reds, —; basic degeneration, —.

CASE IX. S. F., aged fifty-nine, admitted to the Presbyterian Hospital in February, 1916, complaining of general weakness and uncertainty in walking. The patient stated that his present illness began about eight months previously. There was considerable numbness of the hands and feet, and palpitation of the heart with dyspnea on exertion. Examination showed the patient to be very anemic, with pale skin of a yellowish tinge. The upper extremities were normal, and there was no tremor or dysmetria. The tendon reflexes were equal and normal. Pain sensation and the sense of muscular position were both normal, but the patient complained of a feeling of numbness in the fingers. His station was fair; his gait, distinctly ataxic. The lower limbs were weaker than normal, but considerable power remained. The tendon reflexes were all moderately increased,

but equal on both sides. There was a distinct Babinski sign on the left side, but this was uncertain on the right side. The sense of muscular position in the toes of both feet was greatly impaired, but the left seemed to be more markedly affected than the right. The vibration of the tuning-fork could not be recognized anywhere in the bones of the lower limbs as high up as the knees. Sensations for pain, touch, heat, and cold were everywhere normal. The blood count showed: Hemoglobin, 30 per cent.; erythrocytes, 1,900,000; leukocytes, 6,200. The differential count showed a preponderance of mononuclear and lymphocytic cells. The red cells were large, and a few nucleated red cells were found. The Wassermann test of the blood serum and the spinal fluid was negative. No cells were found in the spinal fluid.

Society Proceedings

AMERICAN NEUROLOGICAL ASSOCIATION

MAY 8, 9 AND 10, 1916

The President, DR. L. F. BARKER, Baltimore, in the Chair

(Continued from page 342)

PROGRESSIVE ATROPHY OF THE GLOBUS PALLIDUS

A SYSTEM DISEASE OF THE "PARALYSIS AGITANS TYPE" BEGINNING IN EARLY
LIFE AND ASSOCIATED WITH ATROPHY OF THE MOTOR CELLS OF
THE GLOBUS PALLIDUS MECHANISM

THE SYNDROME OF THE GLOBUS PALLIDUS

By J. Ramsay Hunt, M.D., New York

It is almost a century since James Parkinson wrote his celebrated "Essay on the Shaking Palsy" (1817) and clearly outlined the chief clinical features of the disease which now justly bears his name. Since his time there have been many important contributions to the symptomatology and a vast amount of pathological research in the effort to find and identify the essential lesion of this disease. The more recent monographs show a great diversity in the supposed pathological lesions, and an absence of any well defined conception as to the underlying pathological condition. The theories, even of to-day, include such widely different structures as the cerebral cortex, cerebellum, basal ganglia, the brain stem and spinal cord. Even the glandular and myogenic conceptions are still upheld by some.

Clinically, three types of the disease are recognized, viz.: the *presenile*, the *symptomatic*, and a rare *juvenile* type. There are also subdivisions corresponding to variations in the symptomatology, *e. g.*, *formes frustes*, paralysis agitans without tremor, and more rarely paralysis agitans without rigidity.

It is most unlikely that an affection which is so diverse in its manifestations should represent a single disease, corresponding always to one uniform pathological condition. It is rather a *syndrome*, including more than one affection, differing pathologically and even clinically, and yet bearing a general resemblance to one another as do cases of spastic paralysis.

Paralysis agitans undoubtedly includes a variety of types which are related clinically, as they present the chief symptoms of *Parkinson's syndrome* (rigidity and tremor), but which must present differences in the localization and character of the underlying pathological lesions. In brief, our position toward paralysis agitans to-day is much what it would be toward spastic paralysis (paralysis with its associated spastic phenomena) if the function and course of the pyramidal tracts were unknown.

In the present study an effort is made to isolate a special group of paralysis agitans cases (viz., the juvenile types) from the larger syndrome, on the basis of certain definite pathological changes in the motor cells of the

corpus striatum; also to indicate the probable extent and nature of the tract system which underlies the affection; and to outline a syndrome for the globus pallidus which is the essential structure involved.

ABSTRACT OF CASES

Case I.—No hereditary or familial history of any similar affection. Onset of the disease at age of fifteen with tremor of left foot and later of left arm with rigidity. Gradual extension of tremor and rigidity to the right arm and leg. Four years after onset difficulty in articulation and deglutition. Gradual progression of all the symptoms; typical attitude and gait with Parkinsonian mask; propulsion—slowness of movement and delay in initiating movement; infrequent winking. Tendon reflexes present and active; at times pseudoclonus; abdominal reflexes present. No Babinski. Sensation normal. Pupils equal and react; optic nerves normal; tremor-like nystagmus. For twenty years patient was under observation in the Montefiore Home. In last years of the disease was almost totally rigid and immobile, with marked tremors of the face, tongue, arms and legs, of the paralysis agitans type; also dysphagic and almost anarthric. Abdominal reflexes were usually elicitable up to the last. No Babinski; no plantar flexion of the toes. No spasmodic or athetoid movements. No special intelligence defect. General visceral examination negative. Urine normal, Wassermann negative. Exitus at the age of forty from exhaustion, cardiac failure and edema of lungs.

Diagnosis: Paralysis agitans (juvenile type).

Duration of the disease: Twenty-five years. Autopsy twenty hours after death.

Case II.—(Abstract of History.) A woman aged thirty-three has been under observation at the Montefiore Home for past four years. No hereditary or familial history of any similar trouble. Onset of the disease at the age of thirteen with tremor of the right arm; one year later it appeared in left arm. At age of fifteen left leg became weak and tremulous and a year after this right leg similarly affected. Gradual progression of weakness, stiffness and tremor. At age of twenty-three difficulty in swallowing liquids and articulation became slow and difficult. There is the typical facies, posture, gait, rigidity and tremor of paralysis agitans. Propulsion—slowness of movement and of motor initiative; infrequent winking. Tremors of the extremities are coarse but diminish on intention; there is also some tremor of tongue and face, and a nystagmus-like tremor of the eyes. Speech is slow, low pitched and dysarthric. Tendon reflexes are present and moderately active; no clonus; no Babinski; abdominal reflexes are present. Pupils equal and normal; eye grounds negative; sensation normal. Urine normal and Wassermann test of blood and cerebrospinal fluid is normal. General visceral examination is negative.

Diagnosis: Paralysis agitans (juvenile type).

Pathological Examination. Case I.—A general autopsy was performed twenty hours after death. There were no noteworthy lesions, macroscopic or microscopic, of the viscera or ductless gland system. The brain and cord were removed and placed in 10 per cent. formalin and later in Müller-formol solution. *Macroscopically* no pathological changes were noted in the meninges or central nerve structures. The cerebral vessels were practically free from arteriosclerotic changes.

Microscopic studies were made of various regions of the cerebral cortex (frontal, motor, occipital and temporal), the cerebellum including the dentate nucleus, the optic thalamus and corpus striatum, the crus cerebri, pons, me-

dulla and spinal cord. The methods and stains used were those of Nissl (toloidin-blue), van Gieson, hematoxylin-eosin, Sims, Weigert and Cajal glia stain, and the Weigert-Pal and Nulschitsky methods.

No pathological changes were noted except in the corpus striatum and these consisted of *atrophy and diminution in number of the large motor cells of the globus pallidus system*. The blood vessels were nowhere thrombosed nor occluded and only a very moderate degree of arteriosclerotic change was noted in certain of the vessels of the cerebrospinal axis. There were no evidences of inflammatory changes or gross lesions.

The Corpus Striatum, Thalamus and Hypothalamic Region.—A. Corpus striatum: In this region there is widespread atrophy and diminution in number of the large motor cells of the *globus pallidus system*. The large multipolar cells of the *globus pallidus type* which are scattered through the putamen and caudate nucleus also participate in the atrophy as well as the cells of the *nucleus Basale* of Meynert. These cells are similar in structure to those of the globus pallidus proper and are evidently similar in their function. Comparative cell counts with normal sections as a control show a reduction of from one quarter to three quarters, the greater number of the remaining cells showing various stages of chronic cellular atrophy. There is a moderate increase of glia nuclei in the regions involved, but no inflammatory reactions or noteworthy vascular changes. The globus pallidus contains an unusual number of highly refractive hyalin deposits of elongated or concentric configuration. These concentric calcareous-like bodies are also present in the normal controls, but are less numerous and are of frequent occurrence in this region. The smaller ganglion cells of the putamen and caudate nucleus are well preserved and present no evidence of atrophy or diminution in number.

B. The cell groups of the optic thalamus are well preserved and are not atrophic. The ganglion cells of the nucleus ruber, corpus Luysii and the substantia nigra are also normal in number and appearance. (The sympathetic vagus nucleus shows no evidences of atrophy.) The nerve tracts of the pons, medulla and cord show no evidences of atrophy. The corticospinal tracts (pyramidal tracts and internal capsule) are intact. There is some thinning of the ansa system (ansa lenticularis et peduncularis). There is no reduction of the medullary laminae of the globus pallidus or optic thalamus.

Résumé.—Histological examination of the central nervous system in this case reveals as the essential lesion: atrophy and disappearance of the large motor cells of the globus pallidus system. These cells are most numerous in the globus pallidus, but are found in considerable number in the caudate nucleus and putamen, also in the ansa radiations and in the Basal nucleus of Meynert. They constitute the essential motor nucleus of the corpus striatum and histologically are of the motor type. They may be regarded as the homologues of the cells of Betz in the motor cortex and the large multipolar cells of the anterior horns.

This lesion Dr. Hunt believes to be a primary atrophy (abiotrophy) of the motor or efferent globus pallidus system. It is a system disease and constitutes a pathological and clinical entity in the Parkinsonian clinical group. In a considerable number of the recorded cases of juvenile paralysis agitans a well-marked *familial tendency* has been observed which is corroborative of this pathological conception. It is not unlikely that the *presenile* and *symptomatic* forms of paralysis agitans are dependent upon senile degenerations and arteriosclerotic changes in various portions of this same mechanism.

The Syndrome of the Globus Pallidus.—A system degeneration limited to the motor cells of the globus pallidus mechanism is an ideal lesion for the construction of a *syndrome* of the globus pallidus. In recent years there

have been described two important syndromes of the corpus striatum, viz.: (I) the Vogt syndrome, characterized by spastic diplegia with double athetosis and pseudobulbar palsy. The lesion in this group of cases is a destructive one (*état marbré*) limited to the caudate nucleus and the putamen. (II) Wilson's syndrome based on the progressive lenticular degeneration, with rigidity and tremor of the Parkinson type, dysarthria and in some of the cases clonic and tonic spasms and athetoid movements. Among the first recorded cases of this affection were those of Gowers under the highly descriptive title of tetanoid chorea. Dr. Hunt attempts to explain and reconcile these two syndromes and their points of difference in the *syndrome* of the globus pallidus.

The corpus striatum is composed of the globus pallidus, the putamen and caudate nucleus. The globus pallidus and the putamen constitute the nucleus lentiformis of which the putamen forms the external segment. The globus pallidus, phylogenetically, is the older portion of the corpus striatum (the paleostriatum) and is found in the lower forms of fishes. The putamen and caudate nucleus on the other hand represent a later development of the corpus striatum which first appears in reptiles (neostriatum). The caudate and putamen are similar in structure and doubtless subserve a similar function. They become separated in the higher forms only by the development of the internal capsule.

The neostriatum (caudate and putamen) is composed of numerous small ganglion cells, through which are scattered the large multipolar cells of the globus pallidus type. These larger cells Dr. Hunt regards as part of the globus pallidus system and as subserving a similar function. There is, therefore, in the neostriatum a mixture of both types of cells, the large motor cell of the paleostriatum and the small cells of the neostriatum. These two types of cells have separate and distinct functions, viz.:

The large ganglia cells of the globus pallidus system are efferent or *motor*.

The small ganglia cells of the neostriatum (caudate and putamen) are *inhibitory* and *coördinating*.

The globus pallidus system is the motor centre proper, while the neostriatum forms an inhibitory and coördinating cortical mechanism which is controlled by pathways from other portions of the central nervous system.

The mechanism which is involved in this disease is the *motor or efferent system of the globus pallidus*, which acts upon subordinate nuclei in the hypothalamic region; the nucleus ruber, the corpus subthalamicum and substantia nigra, and through them exercises a controlling influence upon the extra-pyramidal tract system.

The globus pallidus cells occupy the same position in this automatic motor system as do the cells of Betz in the corticospinal system; the globus pallidus mechanism controls automatic and associated movements, whereas the higher cortical centers are concerned with complicated synergic and discriminative movements. Both of these motor mechanisms, in addition to the function of motor innervation, have also a controlling or inhibitory effect upon muscle tonus, and a destructive lesion in the case of the globus pallidus produces not only paralysis of certain automatic and associated movements, a slowness of movement and loss of motor initiative, but a great increase of muscular tonus as well (rigidity).

For many years it has been observed that chorea and athetosis frequently result from lesions in the region of the putamen. Recent investigations by Jelgersma, Alzheimer, Marie and L'hermitte and Dunlap have shown that hereditary chorea is associated with marked atrophy and disappearance of the ganglion cells in the caudate nucleus and putamen, with increase of the glia nuclei. So that the connection between the symptom, chorea and the

neostriatum is a very close one. Dr. Hunt has been able to study the specimens of a series of four cases of Huntington's chorea and finds that the large cells of the globus pallidus system are well preserved amid the wholesale destruction of the smaller ganglion cells of the neostriatum. The cell atrophy of the corpus striatum in Huntington's chorea appears to be limited to the smaller ganglion cells, and he regards these smaller ganglion cells with their short internuncial fibers, which terminate in the outer and inner segments of the globus pallidus, as exercising a coordinating and inhibitory control over the larger motor cells, and when this is lost the phenomena of chorea result. This small cell system stands in relation to chorea and the large cell system of the globus pallidus to the paralysis agitans syndrome. When there is a destructive lesion involving both types of cells in the caudate nucleus and the putamen, there results the Vogt syndrome of the corpus striatum, viz., double athetosis with spastic contractures and pseudobulbar palsy. In other words, athetosis and mobile spasm represent chorea plus a slight rigidity from involvement of the globus pallidus cells.

If the caudate nucleus and the lenticular nucleus are the seat of a massive destructive lesion, as in the progressive lenticular degeneration, there results the symptomatology of Wilson's disease, viz., the paralysis agitans syndrome with tremor and rigidity, but also associated with clonic and tonic spasms, and occasionally choreic and athetoid movements (Gowers' tetanoid chorea). Dr. Hunt therefore regards the corpus striatum as representing two important groups or systems of cells (paleostriatal and neostriatal) with totally different functions; one motor, the globus pallidus system, and the other coordinating and inhibitory, the small polygonal cells of the neostriatum. The globus pallidus occupies a position in the motor system somewhat analogous to the optic thalamus in the sensory system with which it is closely associated; and is engaged largely in the performance of functions which have to do with the association of movement and automatism. It has important independent functions but at the same time is closely associated with the cortical motor mechanism. A paralysis of either produces a characteristic and distinctive symptomatology. A lesion of the pyramidal tract system is followed by the phenomena of spastic paralysis; a lesion of the globus pallidus system by the phenomena of paralysis agitans.

The syndrome of the globus pallidus may be summarized as follows: An affection of the efferent motor system of the globus pallidus mechanism has, as a result, the paralysis agitans syndrome pure, viz., paralysis of certain automatic and associated movements, rigidity and tremor.

An affection of the small cell system of the neostriatum releases the motor mechanism of the globus pallidus from control, and there results the phenomena of the chorea of Huntington.

A destructive lesion of both types of cells produces chorea, athetosis, spasms, rigidity and tremor in various combinations.

The presence of the Vogt syndrome and Wilson's syndrome will depend upon the localization and the extent of involvement of these two cellular systems.

Dr. Smith Ely Jelliffe agreed with Dr. Hunt that further analysis of the paralysis agitans syndrome is not only desirable but imperative. Neurological science is still too much burdened with entity concepts and it is advantageous to dismember the large paralysis agitans group. The method of doing it as just proposed is not so worthy of commendation. Disease in one synapse in a pathway does not describe a syndrome. Dr. Hunt's analysis is therefore far too fragmentary. Moreover, the functional relationships of the cell groups are not discussed nor even presented by Dr. Hunt. Malone's work on these groups is not considered. With reference to Dr. Hunt's remarks relative to Huntington's chorea, Dr. Jelliffe would state that Dr. Hunt

is not entitled to draw the deductions because the hereditary, biological data negatives the narrow interpretations Dr. Hunt has assumed.

Dr. B. Sachs was absolutely in sympathy with Dr. Hunt, to separate some of the groups of paralysis agitans. It was Dr. Hunt's first case mentioned that he had an opportunity to study. The case of this boy impressed Dr. Sachs at the time by the fact, and he thought he made the statement accordingly, that here was a case of paralysis agitans appearing in early life and with some of the symptoms that we ordinarily associated with disseminated sclerosis. In other words, when the disease occurs in early life it had some of the symptoms which we knew always occurred in early life, although the other disease appeared later in life. Dr. Sachs had no right, nor had he the desire, to deny that it may be due to changes in the globus pallidus and that there may be some explanation for the lesions in other cases of paralysis agitans. He thought there is one point we must consider thoroughly, that is, that in a disease lasting twenty years these changes in the globus pallidus are the only changes that Dr. Hunt is able to put his finger on. The danger of making that the seat of the chief pathological lesion is a very great one. The question arises are not they simple terminal changes. Have they any actual causative relation to the disease which has lasted twenty years? Dr. Sachs presumed the central nervous system has been gone over thoroughly. In a case of this sort it would be absolutely necessary to see the anterior pole of the brain and the very lowest part of the spinal cord in order to be sure that we had really got at the chief changes underlying the disease. The changes in the globus pallidus are undoubted, but whether that is the sole lesion in this form of disease we must reserve judgment until we find exactly the same changes in an entirely parallel case.

Dr. J. Ramsay Hunt said that while the pathological conclusions were based upon the study of one case, this case had been very carefully observed and thoroughly studied by modern histological methods. The large cells of the globus pallidus, as well as the cells of similar type which are scattered through the putamen and caudate nucleus, were definitely atrophic, so that Dr. Hunt regarded this as a system disease limited to the cells of the globus pallidus mechanism. The small ganglion cells of the neostriatum were not affected so that in this respect the atrophy was selective and definitely limited to a homologous cell type. That the cells showed a considerable diminution in number was shown by careful comparative cell counts of normal specimens at the same level and stained by the same histological methods. The reduction in the double number of cells varied from one sixth to three fourths in the different regions involved. Phylogenetically the globus pallidus mechanism is very old and is well developed as low in the animal scale as fishes; ontogenetically the tract system of the ansa lenticularis appears very early in the life of the fetus, so that this nucleus unquestionably has an important motor function. It is a motor controlling mechanism subsidiary to that of the cortical system and concerned largely with the control of automatic and associated movements.

INTRACRANIAL MURMUR OF LONG DURATION AND SPONTANEOUS CESSATION

By Frank K. Hallock, M.D., Cromwell, Conn.

Female, 40, with cardio-renal disorder and of neurotic heredity; with a long series of recurring neuropathic manifestations, chiefly autonomic type; somatic and neurologic examinations being negative. Murmur: marked objective in the left occipital region, systolic bruit existing from childhood; at thirtieth year Dr. M. Allen Starr diagnosed case as hysteria with aneurysm

of the basilar artery; at thirty-third year the murmur ceased suddenly without apparent reason for three days and then returned; no special change in character of murmur for the next five years; at her thirty-eighth year she sailed for Naples, the murmur remaining constant on the trip over and while she was on land; she returned on a vessel noted for noise and vibrations, and amidst the commotion of sounds and shaking the patient lost consciousness of the murmur; on landing she became fully aware that the sound had gone, and it has remained absent for over two years.

The systolic bruit can be plainly heard by the ear and stethoscope at all points on the cranium, but is most marked in the left occipital and post-auricular regions. Ordinary body movements do not modify the sound to any extent; turning the head sharply to the right stops the murmur completely, both objectively and subjectively; extension of the head vertically lessens the sound; rotation of the head to the left or flexing it downwards does not change it. Compression of carotids does not influence the murmur. Never any signs of cerebral pressure. Occasional transitory attacks of tinnitus aurium.

Diagnosis of case can only be speculative; nothing similar has been found in the literature. Most likely the vertebral or the basilar artery is involved in the production of the murmur, which would ordinarily be diagnosed as aneurysmal. The patient was the subject of chronic and profound vasomotor instability, but in later years the vascular system became better balanced and more stable. It is a fair inference that the blood current involved in producing the murmur was capable of a functional range of unusual character or degree, and also that the more stable and equalized vascular system resulted in a lessened flow of blood in the cerebral vessels and a slight diminution of the fluid volume within the cranium. These facts, if true, would favor the cessation of the murmur. Autopsy alone can fully explain the abnormality.

LESIONS OF THE FRONTAL LOBES

By Edward M. Williams, M.D., Sioux City, Iowa

General discussion. Three cases presenting unusual symptomatology. Case I.—Symptoms beginning four months after an injury (no unconsciousness, etc., at time of injury), headache, voracious appetite and thirst, impotence, incontinence of urine and feces, weakness and ataxia of arm and leg contralateral; double neuro-retinitis more advanced on diseased side (rt.), peculiar emotional state; facial expression of anxiety or fear. Operation and removal of old clot from right prefrontal and midfrontal region and recovery complete. Case II.—General symptoms and voracious appetite and thirst, loss of sexual desire; right ptosis for couple of weeks clearing up and at time of observation left oculomotor paralysis complete with ptosis. Optic neuritis further advanced on diseased side; twitching of right hand and ataxia of left arm and leg. Operation—inoperable tumor of left prefrontal region, probably melanotic sarcoma. Case III.—General symptoms of tumor and childishness and irritability, loss of memory beginning four years previously, optic neuritis changing as to side of greater involvement; voracious appetite and thirst, beginning couple of years previously; weakness of right arm beginning four years before examination; spells of foolish laughter for several weeks before operation; Babinski on right later disappearing. Left midfrontal region exposed and subcortical encapsulated growth removed. Patient apparently recovered; in few weeks relapsed and died. Autopsy—similar growth in left prefrontal region and one in right parietal lobe, both subcortical. (Read by title.)

DYSTROPHY AND CALCIUM METABOLISM

By Edwin G. Zabriskie, M.D., and D. M. Kaplan, M.D.

A preliminary report of a case of dystrophy with peculiar distribution of the adipose covering the extremities and with an apparently distinct relationship of the development of the disability to child-bearing and a rapid increase in weight. The calcium retention is found to be diminished.

Dr. M. A. Bliss read a paper entitled Werdnig-Hoffmann, Early Infantile Progressive Spinal Muscular Atrophy. (See this Journal, Vol. 44, p. 108.)

Dr. Francis R. Fry said he had seen the case which Dr. Bliss reported. In looking at it one was forcibly impressed with the fact that it was a progressive muscular atrophy as distinct from a paralysis. He was not familiar enough with the subject to determine where it should be classified.

Dr. M. A. Bliss said Dr. Fry and he had seen another child, from Oklahoma, having much the same history. The symptoms began as in the former case with intestinal upset, and now the patient was so weak as to be unable to sit up even with support.

AMYOTROPHIC LATERAL SCLEROSIS

By John H. W. Rhein, M.D.

Patient, age 56; symptoms, atrophy of both arm muscles, including small hand muscles, flexors, extensors of forearm, biceps, triceps, shoulder girdle muscles, pectorals and serratus magnus. Tongue atrophied on both sides. Fibrillary tremor of both arms. Knee jerks and arm jerks exaggerated; no Babinski; no spasticity; positive Wassermann reaction. Death about a year after onset. Autopsy. Pathological findings including study of the cord, medulla, pons, internal capsule, basal ganglia, corpus callosum and cortex with Marchi as well as other methods. Discussion of the pathology of this disease.

Dr. F. R. Fry, of St. Louis, said some years ago he reported two classical cases of Friedreich's ataxia in sisters about twelve and fifteen years of age respectively. At a later period their mother, who was then about forty-two years of age, developed classical amyotrophic lateral sclerosis. He mentioned the coincidence as possibly interesting from an etiological standpoint. Does this syndrome represent the same kind of abiotrophic tendency that Friedreich's disease does?

Dr. S. Leopold, Philadelphia, said he reported a case of this disease in which death occurred within two years. He found some round cell infiltration and in examining the literature found that in about one third of the cases syphilis played a very important rôle. Syphilis, therefore, may be a predominant feature in these very rapid cases.

Dr. D. I. Wolfstein, Cincinnati, recalled a case he saw. This was a case of extreme emaciation coming on suddenly in a woman who had weighed 216 pounds; within a few weeks, she was reduced to 120 pounds. All the muscles were atrophied throughout the body, there was extreme muscular weakness, but the onset was never in any special muscle-group. The only pathological sign, aside from the above, was the absence of knee jerks. There was never any fibrillary twitching. The fat disappeared from the face, and in the mammae; the woman was intensely weak. There was no sensory impairment; there was no tuberculosis; there was no evidence of Graves' disease. Dr. B. Sachs saw that case with Dr. Wolfstein. There seemingly was absolute absorption of fat from the muscles themselves as well as between and

around them, but electrical examination failed to disclose any abnormality in the muscles. There was no place in the whole body, face, trunk and extremities which did not show the extreme wasting. Tuberculosis and Addison's disease were excluded as factors and although endocrine disturbances were considered, it could not be established in connection with any particular organ. X-rays of the hypophysis as well as other plates gave no information.

This woman had for a time slight impairment of fecal evacuation and weakness of the bladder, but only as part of the general muscular weakness. She has since recovered ten or fifteen pounds in weight and is decidedly stronger.

Dr. Wolfstein did not recall except in tuberculosis, cachexias, or the acute infections such an extreme wasting.

Dr. B. Sachs said the result of Dr. Wolfstein's case was extremely interesting. The suspicion in Dr. Sachs' mind was that they could not absolutely eliminate some deep-seated glandular trouble and possibly after all some latent chronic tuberculous process in the peritoneum or elsewhere, something in the abdominal glands that could not be made out. In that case there was not only general weakness but decided atrophy of every muscle in the body. It was the most surprising thing he had seen.

Dr. John H. W. Rhein regarded his case at first as one of syphilitic origin, as the Wassermann reaction was strongly positive. He planned to give the man some salvarsan, but he had received mixed treatment in the interval. At the autopsy Dr. Rhein was surprised to find an absence of all the characteristic signs of syphilis in the cerebro-spinal system. He examined for round-cell infiltration and the blood-vessel changes characteristic of syphilis and found nothing excepting some insignificant changes in the pia from the frontal region.

FAMILIAL SPASTIC PARALYSIS

By C. Eugene Riggs, M.D.

Report of three cases in one family. Family history normal, except epilepsy in uncle on father's side and hemophilia in an aunt on mother's side. Six children in family, three boys and three girls. The latter all show symptoms of this disease, without any definite etiological factor.

Dr. John H. W. Rhein said that about two years ago he reported before the Philadelphia Pediatric Society, a family which was very similar to that described by Dr. Riggs. There were five members, all of whom were affected in the same way, one child escaped. All of these children developed the disease at the fourth year of life, the symptoms consisting of a spastic condition of the legs and the spasticity gradually extended to the arms and later affected the speech and mentality. One of these children died at the age of fourteen, after a series of convulsions. The Wassermann reaction of the father, mother and children was negative. This was the only generation in which the disease occurred.

He examined the literature and found reported by some ninety observers 111 families with various forms of family spastic paralysis. These cases could be readily divided into various classes from the pure spastic paraplegic type through a series of groups up to the Friedreich's ataxic group. Of these 111 families, 36 presented a pure type of spastic paraplegia. In 7 families the arms were involved. In 7 other families tremor of the arms and legs was associated with spastic paraplegia. In 20 families cerebral symptoms occurred. In 6 families atrophy of the arms or legs complicated the picture. In 6 families bulbar symptoms occurred. In 21 families dissemi-

nated sclerosis syndrome was present. In 8 families the symptoms were of cerebral diplegia.

The disease developed at the walking age up to seventy years of age. In 72 families the symptoms began under eighteen years of age, and in 46 of these began under ten years of age. In some members of the same families the ages were in some over ten years and in others under ten. For example, in one member of a family it began at four years of age, and in another at fourteen years of age. In another family one member developed the disease at three and a half years of age and another at twelve years of age. In a third family the disease developed in one member at two years and in another at thirty-seven years of age.

Many cases seem to follow infectious diseases.

In 22 instances the disease occurred in 2 generations; in 4 instances in 3 generations; in 3 instances in 4 generations, and in 1 instance in 5 generations.

Fifteen autopsies have been made. In five the pyramidal tracts, columns of Goll, and the cerebellar tracts were involved, and in two of these autopsies the anterior horns were implicated. In one case the pyramidal tracts, Gowers' tracts, Flechsig's tracts, Lissauer's tracts, Goll's columns in the spinal cord, and the cortical cells in the brain were diseased. In another case the pyramidal tracts, Goll's columns, anterior horn cells and cortical cells were diseased. In another case there was retarded development of all the tracts of the cord. In a case resembling Little's disease there was defect in the cells and fibers, the details of which were to follow. In one case of diplegia there was atrophy of the cerebellum and pons and diminution of the fibers of the pyramidal tracts. There were three cases of multiple sclerosis. Another case was one of aplasia axialis extracorticalis congenita, consisting of aplasia of the axis cylinders. In another case there were numerous sclerotic foci in the spinal cord and diffuse sclerotic foci in the brain. In a third case the findings were not specific and no evidence of disseminated sclerosis could be observed.

ON THE DIAGNOSIS OF SUB-ACUTE COMBINED SCLEROSIS OF THE SPINAL CORD ASSOCIATED WITH SEVERE ANEMIA

By Williams B. Cadwalader, M.D.

The combined sclerosis associated with pernicious anemia is peculiar in that the long fibers of the posterior column are chiefly affected. Because of this characteristic location of the sclerosis the objective sensory disturbances are impairment or loss of bone sensation and the sense of muscular position. Tactile and pain sensations are preserved. There is ataxia, with some impairment of voluntary muscular power and moderately increased tendon reflexes. The severity of the anemia as shown by the blood count may not be any indication as to the extent of the alteration within the spinal cord.

Dr. J. J. Putnam said that for many years he had taken great interest in the subject which Dr. Cadwalader discussed, but he had little to add to Dr. Cadwalader's interesting account. He was rather surprised that the reader speaks of the knee jerks as typically exaggerated. He well remembered that this same statement was made in the account given by Dr. Risien Russell and others. In the fifty cases observed and reported on by Dr. E. W. Taylor and Dr. Putnam, and in the eight cases observed by Dr. Putnam previously, and in those which he had seen since, the knee jerk has been diminished or abolished; in other words, the effects of the posterior tract changes have seemed to predominate over those of the lateral tracts. Evidently this is not always true.

"Combined sclerosis" has seemed a misnomer as a pathological description of the lesions found in this disorder, which vary greatly from those seen in typical long-tract degenerations, in that the area involved by no means coincides with the long tracts themselves. The tendency of the lesions, indeed, to spread laterally, has always seemed one of the most characteristic features of the disease. This gives rise to the remarkable, perforated appearance which has attracted the attention of various observers.

Dr. C. Eugene Riggs was sure the profession is indebted to Drs. Putnam and Dana for the remarkable work done along this line. It is a notable fact that the majority of the profession fail to recognize the nervous symptoms occurring in pernicious anemia. Some fifteen years ago, at a meeting of this association in Philadelphia, Dr. Riggs reported a case of pernicious anemia, presenting typical nervous symptoms; the pathological findings which were carefully studied throughout the length of the cord were in every way characteristic of this disease. As to treatment, he had, in one or two instances, noticed very marked improvement from the intravenous injection of salvarsan. In a patient, who died recently, he succeeded in obtaining a practically normal blood picture, while the cord symptoms remained uninfluenced. In another case, under his care three years ago, the cord symptoms greatly improved as the blood state approached the normal. Remissions are common. Bramwell cites a case of pernicious anemia, in which the remission lasted nineteen years.

Dr. Charles L. Dana said one point in connection with this type of case which he should like to emphasize is the fact that it seems to be a disease which is rather increasing in this country. Certainly he sees many more cases than he did a few years ago and not long ago he received a letter from a gentleman in charge of a large sanitarium in the middle west and he said he had a great many cases of this type coming to his sanitarium. Another point of extreme importance is this: if you see these cases very early and recognize their character not necessarily by any distinct evidence of pernicious anemia, for you often don't get that, you can control these cases and sometimes keep them well for years. He had a patient of this kind now in the fourth year and distinctly better than when he first saw him. If the cases go on until they are really established death occurs in two or three years almost always. Hence, it is a matter of extraordinary importance to the neurologists and to the general profession to detect these cases early. The general practitioner often thinks it is neuritis in the early stage. You can almost always find a high blood index and that is enough to put one on the alert.

Dr. Hugh T. Patrick said in regard to geographical distribution of this disorder, it may be of interest to note that in France it is scarcely seen at all. For some unknown reason pernicious anemia is relatively rare in France. So when Crouzon wrote a long and excellent thesis on the combined sclerosis of the cord, he was compelled to go to London to study this particular type of combined degeneration.

Dr. L. F. Barker said in his experience the clinical symptoms may vary between two extremes: ataxic on the one hand, spastic on the other. In other words, sometimes the degeneration is more marked in the lateral funiculi and sometimes in the posterior funiculi. There may be every transition between spasticity and ataxia, a very puzzling clinical picture sometimes appearing.

That cases occur without anemia seems important. It would seem clear that the cord lesion is not due to the anemia; the cord lesion and the anemia probably have a common toxic cause.

In this malady a disease of the whole body occurs, and there is another factor that should always be kept in mind. These patients have no acid in the stomach juice.

Another point is the occurrence of the disease sometimes in families. Dr. Barker remembered distinctly two instances in which two brothers were affected. Two brothers in one instance came from the state of Indiana, in another from the state of Tennessee.

The anemia is usually of the Addison-Biemer type, a so-called hemolytic anemia. Internists have been much interested in the relation of the spleen to this type of anemia and Eppinger and others have advised removal of the spleen. Dr. Barker had had the spleen removed in several cases of pernicious anemia. After the operation, some of the patients have had a period of a few months of marked improvement, but in his experience the fatal termination follows all the same, later, and he saw no reason to believe that the removal of the spleen will cure the disease. He had seen the best results from large doses of hydrochloric acid immediately after meals followed by pancreatin and calcium carbonate three hours after meals. Dr. Barker uses also arsenical preparations, together with a period of rest and of general upbuilding. He had one man who had remained for several years very well; his hemoglobin had gone to 108 and he is a robust man now. His brother died from the disease. His own hemoglobin was down below 30 per cent. at one time. Dr. Barker can scarcely believe that he will remain well, but fears that he will ultimately die of the disease.

Dr. John H. W. Rhein referred to a case which came under his observation in which there were spinal cord changes associated with severe anemia, which deviated from the type described by Dr. Cadwalader. Instead of spasticity there was hypotonia with increased reflexes and positive Babinski. The sensory changes consisted of a slight hypalgesia. There was also a marked ataxia. The autopsy showed a widespread degeneration of the postero-median tracts, which in the cervical region involved the postero-lateral tracts where the degeneration was lace-like. In the postero-median columns the degeneration was more diffuse and lacked the lace-like character. In the cervical region and the thoracic region the antero-lateral tracts were implicated as well as the direct cerebellar tracts.

Dr. Williams B. Cadwalader said the appearances of the alterations found in the spinal cord suggest a diffuse, endogenous, toxic process. There are certain cases in which the posterior columns seem to be more severely involved than other parts; in these the tendon reflexes may not be exaggerated. In the late stages the patellar tendon reflexes may be abolished. Dr. Riggs referred to the fact that the general medical profession fails to recognize this disease in the early stages. Dr. Cadwalader is inclined to attribute this to the fact that in the very early stages the characteristic sensory alterations are subjective paresthesia of the extremities and loss of the sense of muscular position of the toes, and the sense of vibration as tested by the tuning fork. These tests are rarely performed by the general practitioner. It is strange that Dejerine should have been the first to describe the characteristic alterations in the posterior columns associated with severe anemia when one considers what Dr. Patrick has said as to the rarity of pernicious anemia in Paris. Dr. Cadwalader would again call attention to the fact that the blood picture is by no means a reliable guide.

A CASE OF POSTERO-LATERAL SCLEROSIS FOLLOWING STREPTOCOCCUS INFECTION—TRANSMITTED TO RABBIT AS MYELITIS

By Edward M. Williams, M.D.

Woman, age 40. Similar attack, less severe, two years ago. Present trouble began two months ago; gradually increased. Legs weak; spastic

ataxic gait; can scarcely walk; paresthesia, but no objective sensory changes except possibly some diminution in senses of touch and position; legs very ataxic; Babinski positive on left; doubtful dorsal flexion on right, clonus of both ankles and increased knee jerks. Six lower teeth removed and cultures showed presence of hemolytic streptococcus; injected into rabbit, caused total paralysis of hind legs and incontinence of urine and feces fourteen days later.

FACIAL DIPLEGIA IN MULTIPLE NEURITIS

By Hugh T. Patrick, M.D.

Infrequency of facial diplegia in multiple neuritis. Etiology. General clinical picture and variations. Relations of double facial paralysis in multiple neuritis to rheumatic facial diplegia and to ordinary facial palsy *ex frigore*. Report of a case. (*See this Journal*, vol. 44, p. 322.)

Dr. Sidney I. Schwab thought the most interesting feature of Dr. Patrick's case, the history of the multiple neuritis with facial diplegia, was the involvement of the bladder and rectum. He had had two cases, in one of which death occurred, the other was with recovery; in both the bladder and rectal reflexes were lost. That brings up two points of particular interest: one is the diagnostic side of these cases, that is the differentiation from so-called myelitic processes and, second, the mechanism of the process itself. It seems almost a clinical proof of the work of Rows, who showed by experimental work that infectious material could be carried through the sheath of the sciatic nerve in certain instances to the spinal cord. Dr. Schwab thought the method by which the spinal cord is finally attacked is through the sheath of some of the peripheral nerves attacked. He believed it is impossible anatomically to produce bladder and rectal insufficiency purely through the peripheral mechanism. It is too complicated and there are too many collateral branches, and it must be concluded that in these cases there is some definite process which reaches the cord along the nerves which happen to be attacked. It would seem we would have to face a toxemia rather than ordinary processes. The other feature Dr. Schwab mentioned is the curious emotional state of these patients. The neuritis itself may be somewhat insignificant, but in the midst of this neuritic complication the sudden or even gradual paralysis causes in these patients, at least in the two he had observed, a most profound emotional disturbance. The last patient he had become very emotional and very depressed, slightly maniacal, and with the disappearance of the facial diplegia these symptoms disappeared. The question arises whether that was not due to the disturbance in the mechanism of expression rather than to anything else. Dr. Schwab had seen it in unilateral facial palsy where the patient becomes suddenly aware of the palsy.

Dr. William G. Spiller said that on account of Dr. Patrick's statement regarding the infrequency of bilateral facial palsy in alcoholic multiple neuritis he desired to place a case on record. A man, aged fifty-seven years, in his service at the Philadelphia General Hospital in 1914, who had used alcohol excessively and had been repeatedly in the drunk ward, had the history of paralysis of the limbs developing as in Landry's paralysis, *i. e.*, the lower limbs were affected before the upper. He was said to have had pain at the onset of the palsy. When seen by Dr. Spiller the lower limbs were almost completely paralyzed but not much wasted. He was able to draw either lower limb up slightly at the hip by the muscles of the trunk. The patellar and Achilles reflexes were lost on each side. The lower limbs were very flaccid. There was little if any pain in the lower limbs in squeezing the muscles and no spontaneous pain. Tactile and pain sensations were normal

everywhere. He had involuntary evacuation of bladder and rectum, possibly on account of his mental condition, and this involuntary evacuation had been of short duration. The thoracic and abdominal muscles were moved freely in breathing. The upper limbs were very weak but not so weak as the lower. The biceps and triceps reflexes were lost. The soft palate, tongue and masseter muscles were moved normally. The lower distribution of the facial nerve was completely paralyzed on each side, and the upper distribution of this nerve was almost completely paralyzed. He could not pucker the lips nor blow out a lighted match. He could close the eyelids only to about half the normal degree. He could not wrinkle the forehead. His voice was peculiar, probably as a result of the facial palsy. He fabricated greatly, said that he had been out of the hospital the day previously, etc. The left pupil was larger than the right. Both irides reacted sluggishly to light, but the Wassermann reaction of the blood was negative.

The man gradually recovered and after some months was dismissed from the hospital.

Dr. Spiller referred to a case of tetanus in a boy he had seen in the Philadelphia General Hospital. Several weeks after the onset of the tetanus when the boy was almost well he suddenly developed unilateral facial palsy. As this paralysis developed as the tetanus was almost cured and without any increase in the symptoms, it was difficult to attribute it to the tetanus, although facial palsy is known to occur in some cases of tetanus. Careful inquiry revealed the fact that the boy had slept in a draught from an open window. The tetanus may have predisposed the nerve to palsy.

Dr. Archibald Church said there was admitted to the Neurological Service at Michael Reese Hospital last November a young man who presented the condition Dr. Patrick has outlined, a rather mild multiple neuritis with diplegia. He made a searching investigation for the cause of the disease. The spinal fluid, blood and everything else which was open to laboratory investigation were entirely negative. The causation therefore was obscure, but this boy's occupation which was a fairly wholesome one, that of a bundle boy in a large retail establishment, gave a little clue. He was excessively fond of candy, to which he had access and ate one to two pounds a day. After the onset of symptoms which were largely sensory, at first, a severe diarrhea developed, attended by numerous very offensive greenish stools. A careful search of the intestinal tract after his admission to the hospital revealed nothing abnormal. His pain was extraordinary, so that he required opiates to control it. He would scream with pain unless this measure were taken. The amount of wasting of the muscles was insignificant. There was slight, practically only a quantitative electrical change. The reflexes were all abolished. Motion was so impaired that he could not rub his face with his hands and the legs were quite inert. He recovered rapidly and was discharged in ten weeks able to walk and feeling quite comfortable.

Another case Dr. Church saw many years ago which followed acute intestinal disturbance. He developed the ordinary type of neuritis, but extremely severe in degree. In this case the muscles of the chest were involved, so that respiration became entirely diaphragmatic and the action of the heart was involved. He could not swallow. Both sides of the face were involved. The man recovered after a long time, but with contractures in the fingers and toes which persisted for many years. In both these cases the presence of intestinal features was of interest in this connection.

Dr. I. Strass called attention to the possible origin of these cases and that of Bell's palsy. It has always seemed to him that the explanation of exposure to a draught in a susceptible person was very insufficient to explain that condition and that possibly there may be a susceptibility of that nerve in

that individual to a toxin which might be bacterial in its nature. Now, of course, all the members of this Association are familiar with the fact that in Chicago almost every disease has come to be regarded as a streptococcus. He merely mentioned the thyroid, gallbladder, the appendix, the joints, arthritis deformans, lastly cysts of the ovary and now, finally, the nerve has come and the spinal cord. The article read by title by Dr. Williams is a case in point and recently before the Society for Clinical Investigation, Rosenow, who has done meritorious work in this field, reported a case of this type. He thought the individual had a multiple neuritis and out of the tooth cavity he obtained the streptococcus. He injected it intravenously into the animals of four different species. In these animals he obtained lesions of the nerves which he has described as neuritis. In a large percentage of the animals the organism showed selectivity for these nerves. Now Rosenow has shown, whether conclusively or not Dr. Strauss did not believe we are as yet in a position to speak, that the streptococcus has apparently a selective affinity for different organs of the body and his latest work has demonstrated that it is possible for this organism to have a selective affinity for the nerves. It may be an interesting piece of research upon the part of some of us to see whether in these cases of Bell's palsy, so-called, even in the cases reported by Dr. Patrick, there may not be at the basis some streptococcus which lies hidden either in a tooth cavity or the tonsils, or elsewhere which may have a selective affinity for such a nerve.

Dr. Charles L. Dana said that the type of cases described by Dr. Patrick was quite rare. In his service in the alcoholic wards of Bellevue for twenty-five years there never occurred a case of facial diplegia. He had had, however, one case which falls definitely into the group that Dr. Patrick has correctly described. This was a case of a young man, a tennis player, very active, athletic and a moderate drinker, who went down to North Carolina and while there, exposed to a good deal of cold and wet, developed a moderate degree of multiple neuritis and very complete facial diplegia. His multiple neuritis was of the type that we used to call pseudo-tubes, *i. e.*, it was of a sensory type, and the patient had more ataxia than he had motor weakness. He gradually but slowly recovered from his neuritis and almost completely from the diplegia. Dr. Schwab has spoken of the mental state. This patient, ten years afterwards, developed melancholia and shot himself. Dr. Dana thought the suggestion Dr. Patrick made that these diplegias are infectious and toxic in character is in harmony with what has been believed in regard to the pathology of facial paralysis, and he did not see that the fact that a neuritis is unilateral need exclude infection. We get infectious herpes. It seems along that line we shall discover the cause of the disease.

Dr. Smith Ely Jelliffe asked what is susceptibility. Dr. Schwab treads very lightly upon some aspects of the emotional side of the problem. The very interesting series of alliances that Dr. Patrick has pointed out could be enlarged. There are other groups of cases which should be brought into comparison with those which he has mentioned. These are the cases that one sees on the psychotic side. These include the melancholias, the hysterical diplegias, the hysterical monoplegias, katatonic facial blockings, etc. If one will take a comprehensive view of the entire organism the question will have to be answered in a much wider sense than either toxemia or heredity. Toxemia can not explain a hysterical facial palsy. What lies behind the individual susceptibility in these cases? It certainly is to be recognized that a toxic factor may be one of the links in the chain, but what about the constitution of the nervous system itself? What about the variations in the makeup of the nervous system? What about those conditions to which

Adler has called specific attention, that is, organic inferiorities with their compensatory psychical equivalents.

Dr. John H. W. Rhein asked how many other cranial nerves were implicated in the case cited by Dr. Patrick. In a case of profound multiple neuritis that he saw recently, there was almost complete paralysis of the arms and legs. In addition to this there was paralysis and atrophy of the tongue, paralysis of the muscles of the pharynx, the masseter muscles, and bilateral facial paralysis and paralysis of both external recti muscles. The man made a remarkable recovery at the end of five months with only slight tongue atrophy and small hand muscle atrophy on the right side.

Dr. S. Leopold wished to place on record a similar case in which the etiology was clear. It showed the typical facial diplegic and multiple neuritic phenomena in which the origin was given as quinsy. Quinsy is associated with streptococci. The etiology might be fairly closely associated.

Dr. Hugh T. Patrick did not care to discuss all the questions brought up because he was not equal to it. He did not see that we must presume involvement of the spinal cord to explain incontinence. We know that in these toxic cases, as indicated by others here, the distribution may be very peculiar. Dr. Rhein's case is practically a multiple neuritis of the cranial nerves. There are cases even in this group in which contrary to the rule of the distal end of the extremities being more involved, the proximal muscles are more involved. He had seen a case in which multiple neuritis was limited to the pelvo-femoral group of muscles. He did not see why in a bad case peripheral involvement of the supply of bladder and rectum should not be a cause of incontinence. He had had one such case in which perfect recovery ensued. If due to bad involvement of the cord that is not very likely. However, there is no reason why this infectious agent should not involve the cord as it does in some of the Landry cases. There was no emotional disturbance in his own case except what was natural to the patient. She was temperamentally cranky. In regard to tetanus, the case spoken of by Dr. Spiller, at any rate it occurred post infection to the rabic virus. Whether Dr. Spiller's case was caused by actual exposure to cold or whether it might have been due to tetanus is open to question. The element of pain Dr. Patrick did not mention. That varies exceedingly. Some cases were absolutely painless, some very painful. He was very much obliged to Dr. Strauss for bringing up the matter of one-sided infection because this question is considered in the paper as written. It is hard to be explained by local infection of the facial nerve and also by a general infection by the streptococcus. These questions we will have to leave to men like Rosenow.

OBSTETRICAL PARALYSIS

By John Jenks Thomas, M.D., and James Warren Sever, M.D.

A study of nearly five hundred cases of obstetrical paralysis; analysis of 160 more recent cases. Pathology, etiology, treatment, including a new operation for the correction of the deformity following this type of paralysis. (*See this Journal*, vol. 44, p. 389.)

Dr. Charles K. Mills had seen many cases of obstetrical paralysis and had also published something with regard to traumatic brachial palsies. One point seems to have been omitted, or else he did not listen with sufficient attention. These obstetrical palsies are due in a considerable percentage of the cases not to the direct lesion of the brachial plexus or of the shoulder, although these may be present, but to avulsion of the nerve roots of the

plexus. This should be understood. Dr. Mills works sometimes with T. Turner Thomas, of Philadelphia, in connection with cases of injury to the shoulder and plexus. With regard to one of these he contributed a paper to one of the journals. However, what Dr. Mills said did not take away from the value of these observations and these experimentations for relief. Injury of the plexus which frays the nerves nearly always occurs, but in addition there is often avulsion of the nerve roots or certain of the nerve roots of the plexus, and therefore a total and permanent destruction which never can be fully or very largely relieved except by adaptation or compensatory operation. In other words, what you obtain through work like this, which is excellent, is similar to that which is secured by good surgery after poliomyelitis by osseous, tendinous, joint or nerve operations. His only point is that sufficient attention has not been directed to the question of nerve root avulsion.

Dr. A. S. Taylor said there are two or three points he would like to make concerning brachial palsy injuries: in the first place, in regard to the etiology. In a paper presented to this Society in Baltimore there were quoted at least twenty experimental productions of this lesion on new-born babes who had died a few hours after birth. In every one the lesion was extraspinal. Of sixty operative cases, in only 10 per cent. was it fair to presume that there was an intraspinal lesion. In an emergency case, which has not been published, in which he was called upon to deliver a woman with a badly deformed pelvis, it was necessary to do version with breech extraction. Feeling that a brachial lesion was exceedingly apt to occur he put most of the traction on the lower extremities of the child until they were so damaged he did not dare to continue, then the pull was exerted over the shoulders. A lesion of the brachial plexus was prophesied and it did occur where he stated, before the delivery of the child's head, that such a lesion would occur, and when the child was delivered it had the typical deformity. Two hours after delivery it died of subdural hemorrhage over both hemispheres.

He was able to harden the entire child in formalin and then dissected out the entire plexus and found the typical picture which had been prognosticated by the pathologist from his study of the older lesions. He found the whole picture there, extraspinal, showing frayed lesion of nerve, plus torn deep cervical fascia and infiltration of the whole region with blood, which gives for a time the entire picture which is seen in brachial birth palsy. It seems that that one case alone disposes of the question of the etiology and pathology of this lesion in the large majority of instances. With regard to treatment, it seems that the work shown by Dr. Thomas and Dr. Sever is most important, since, in the majority of cases, the lesion has been allowed to run so long that secondary pathological features due to contractures and deformities in growth occur. It is quite important, therefore, that this orthopedic work, which is corrective, should be done in association with nerve repair and nerve regeneration. In about 15 per cent. of sixty operative cases Dr. Taylor had found one, or sometimes two, nerve roots completely torn off and displaced for an inch or more from the proximal portion of the root. Now in those cases an early exploration would have given opportunity for nerve repair with the best final result. In three or four cases they had had rupture of the entire plexus. In those cases you get nothing without nerve repair. If one explores a child in the early weeks of its career and one does not find damage to the plexus requiring surgical repair he has done nothing more than make an incision about two inches long in the skin, subcutaneous fat and fascia. That gives one an opportunity to thoroughly explore the brachial plexus. On the other hand, if you find serious damage to that plexus then you do the surgical repair at the time most favorable to the child and the risk you

have run is entirely justified by the great improvement in the ultimate prospects of the child.

Dr. John Jenks Thomas thought Dr. Taylor had answered fully what Dr. Mills spoke of. We know that the lesion in these cases is not a constant one. It varies in severity and in the situation of the injury. Occasionally evulsion of nerve roots is seen. Some of his cases had shown complete separation of the nerve bundles of the plexus. He could not agree with Dr. Taylor in the advisability of early exploratory operations in all cases. Certainly he thought that should never be done in cases where at the time, soon after birth, the injury is limited to the upper arm group of muscles. These cases practically all show partial recovery after operation. The question is somewhat different when we come to total arm paralysis. He thought their work had given a clue as to why this is so. In the upper arm paralysis, the nerves are stretched and there may be fraying out of the fibers and hemorrhage within the sheath, there is no complete separation or tear of the plexus. The only complete injury found then is the tearing off of the suprascapular nerve. To suture the suprascapular nerve, which is very small in the infant, is practically impossible. Dr. Taylor spoke of the operation being a slight one. It is not so slight. The process of repair by secondary suture can take place after a long time. Dr. Thomas's plea is that we should make our treatments suit the individual case; not to proceed to exploratory operation very early after the birth of the child, but to allow sufficient time to elapse to see if this is necessary, and then to adapt treatment to the individual case. In a number of their cases when the plexus was injured very severely they had found that there was a tearing out of the nerve roots, but of the lower part of the plexus chiefly. That explains why, almost invariably, where there has been total arm paralysis at first, partial recovery takes place; then we have not total paralysis but paralysis of the lower arm type with wasting of the muscles of the lower arm group. He would be glad if any surgeon can tell him how he can suture into the spinal cord. They have had cases where at operation the lower cervical roots were evulsed, and they have had to transplant these roots into the higher cords of the plexus and then they have obtained some partial recovery. This operation is suitable for the cases where recovery is taking place, in the upper arm muscles. This operation they have described on the shoulder joint and subscapular tendon is intended for the cases where recovery starts fairly soon, but where in spite of passive movements and exercises contractures take place, and for those cases which have been neglected. He had had a number of cases of total arm paralysis where treatment was kept up persistently by passive movements and exercise where no such contracture formed. He can show cases where not one man out of a hundred could make out the difference between the two arms, and yet at the first the paralysis was a severe one, affecting all the muscles of the extremity.

A paper entitled "Recurrent Poliomyelitis," by Dr. E. W. Taylor, of Boston, was read by title. (See this Journal, Vol. 44, p. 207.)

(To be continued)

CHICAGO NEUROLOGICAL SOCIETY

APRIL 20, 1916

The President, DR. J. C. GILL, in the Chair

PRESENTATION OF TWO COLORED SISTERS WITH THE
CHARCOT-MARIE TYPE OF MUSCULAR ATROPHY

By Peter Bassoe, M.D., and E. W. Ryerson, M.D.

Dr. Bassoe said the cases were of considerable interest because they present a rather unusual form of muscular atrophy, and on account of the family history, which shows that there are a good many cases in the family. Unfortunately, he had not been able to make a personal examination of the other members of the family, because they do not live in Chicago. However, the mother has some deformity; she has one deformed foot and is said to have a deformed hand also. There are three older sisters. One is well and works in Chicago. Another has deformities of some sort of the feet, and the third one, sixteen years old, is also affected, but to a much less degree than the girls shown. These girls are the youngest of the family.

One of the children is thirteen years old. The older sister, who lives in Chicago, says positively that nothing was noticed until she was nine years of age, that is four years ago. Then she began to develop weakness, difficulty in walking and in using the hands, and gradually the present condition has developed, which consists of a flexor contracture of the hands and a marked atrophy of the muscles of the hands and the lower half of the forearm. Farther up in the arm and around the shoulder the muscles are in good condition. The feet show an analogous condition. There is a marked weakness of the extensors. A talipes has developed, which has decreased since Dr. Ryerson cut the Achilles tendon. The upper part of the arm is in good condition. The shoulder muscles are in good condition, so that the wasting is the opposite of that in ordinary myopathy in children. There is a muscular atrophy of the distal type, of similar distribution to that of progressive muscular atrophy of the adult.

In the lower extremities, there is the same condition of a decided wasting in the lower part of the limb, while the thigh is in good condition. There is some contraction in the quadriceps, but not sufficient to raise the limb. The power of the muscles moving the ankle is *nil*.

The knee jerks are absent. The ankle jerks, obviously, could not be obtained, on account of the tendon operation. The elbow jerks are obtainable, but not the wrist jerks. Sensation is normal.

There is a decided contracture of the hand; the fingers cannot be extended.

The second girl is nine years old. The onset is said to have been at the age of six, and her case is really more instructive because the condition is not so far advanced. The same type of atrophy exists in this case, but no contractures have as yet developed, showing plainly that the atrophy precedes the formation of the deformities. The right hand is more affected; she can not straighten the fingers out herself, but they can be passively almost completely straightened. She, too, presents an atrophy of the proximal portions, and the lower extremities are similarly affected, but not so far advanced as in the other child. Very weak knee jerks are obtained in her case. Plantar reflex is practically absent in both patients. The electrical reactions would be of interest, but the speaker has purposely not tested them. The children

have been rather afraid, and he knew that if he tested the electrical reactions he would never get them to the meeting.

The cases clearly belong to the distal type of muscular atrophy occurring in childhood, and the question merely is whether the condition is one of primary myopathy, or whether there are lesions in the central nervous system.

From what little survey of the literature Dr. Bassoe has made, it appears that both forms do exist. There are probably a few cases of pure distal myopathy in children, with little or no change in the central nervous system. The type of muscular atrophy present in the two little girls shown is evidently the so-called Charcot-Marie or neuritic form of atrophy, in which there are changes both in the peripheral nerves and the cord. When Charcot and Marie first described this form, they laid down some rather strict lines, as follows: Beginning of the atrophy in the hands and feet, with relative integrity of the proximal portions of the limbs; fibrillary contractions and vasomotor disturbances; no pronounced contractions of tendons; frequent cramps; reaction of degeneration; onset in childhood; frequency of the disease in several brothers and sisters.

During the short time Dr. Bassoe has had the little girls under observation, he has not seen any fibrillary twitchings, and he understands that Dr. Ryerson has not seen any either. There are marked contractions of the tendons in the older child. Spiller, in his later writings, has pointed out that, as a matter of fact, while there are cases which fulfill all of Charcot and Marie's requirements, there are others that do not show all the essential features, and show tendon contractures. Some have much sensory disturbance, even pain, and others have little. Some have loss of reflexes and some have the reflexes preserved for some time. There have been very few anatomical examinations made, and Spiller mentions a case in which there were practically no changes in the central nervous system. In other cases there have been degenerations in the nerves, especially in the intermuscular fibers of the nerves—not in the main trunks. In the cord there have been degenerations, in the posterior columns especially, and to a less extent in the pyramidal tracts and in Clarke's columns.

The element of ataxia does not seem to be at all marked in the cases shown.

Dr. Gill asked whether there were any cranial nerve involvement, to which Dr. Bassoe replied that he had not discovered any up to the present time.

Dr. E. W. Ryerson said these little girls had come to him with the presumptive lay diagnosis of congenital club-feet and club-hands, and he did not see them until they were prepared for the operation. The older girl was operated on first, and it was at once evident, when she was brought to the operating-room, that it was not an ordinary case of congenital club-feet. It was also evident that it was not an ordinary case of infantile paralysis, because out of many hundreds of cases of infantile paralysis that the speaker had seen and operated on, he has never seen this distribution of the paralysis: atrophy of the lumbrical and interossei muscles in the hand, and the thenar and hypothenar eminences, combined with a very much localized condition in the feet. It is true that the older girl has a marked weakness in the quadriceps extensors on both sides, which, of course, is very common in infantile paralysis. But the feet do not look like congenital club-feet, and it is almost impossible to believe that they are. The element of equinus is very marked in both cases. The older girl's feet are also in a good deal of the varus position. So it may be possible that they are congenital club-feet, but not as severe as one would expect at the age of thirteen in untreated club-feet. There was no definite plan of operation at first, but after lengthening the tendo Achillis by tenotomy, cutting first one half and then the other half

above and sliding the tendon back, it was found impossible to correct the equino-varus in the older girl. Then an astragalectomy was performed on both feet, modified a little from Kocher. The astragalus on each side was removed without difficulty, and the feet came into a very good position. In order to prevent a recurrence of the varus, which was evidently due to a weakness in the peroneus muscle, a notch was cut in the cuboid bone and the end of the fibula inserted on each side of the cuboid, to keep the foot from dropping as well as turning inward. A typical Whitman operation was not done on account of the equinus condition, which operation is first an astragalectomy and then an advancement of the tibia on the foot. That is the most successful operation in the calcaneus forms of infantile paralysis deformities. It was not done in this case because there was a contracture of the tendo Achillis, and if the foot were displaced backward it would give even greater leverage. So the tibia was left where it naturally fell, and the fibula was fastened into the notch.

The older girl was operated on January 13. She has been without the cast for several weeks, and apparently there is no tendon contraction yet. She can walk pretty well.

The second girl had an astragalectomy done on the left side. On the right side it was found possible, after cutting the tendo Achillis, to force the astragalus back into the notch between the two malleoli, and the further operation of astragalectomy was not needed; but the fibula is very far back, and it is possible that both the varus and the equinus deformity will recur in this case. The varus deformity has begun to recur, because nothing was done to fix it, which the speaker regretted. But the foot went into place so well that he was tempted to try it out. Astragalectomy always gives a very useful foot in cases where it is indicated.

The problem of what to do with the hands is to be determined. The feet are pretty satisfactory in the older case, and Dr. Ryerson thinks they will remain so. But there is a contracture of the flexor tendons of the fingers. It is not a claw-hand deformity. There is not extensor contraction of the first phalanges, and so it is not feasible to perform the operation described by Sherman. It would seem to be wise to lengthen the flexor tendons, but it is not well to do this if it can be avoided. At present the girl is able to use her hands very well. She can embroider, and is able to grasp objects in her hands. Lengthening the tendons is in no way curative. She has no extensor muscles of the wrist. There is nothing to lift her hand back, and it is a question whether or not it would be advisable to do a stiffening operation at the wrist joint, so as to hold the hand in a little dorsal flexion or, rather, extension, so that she can use her hands better. The speaker would be very glad of any advice or suggestions regarding this. The thumb can be approximated to any of the fingers.

Dr. Ryerson had thought of transplanting perhaps the palmaris longus into the base of the thumb, or the tendon of the flexor of the thumb, to see if some flexion could not be obtained in that way. The distribution of paralysis is very curious in this case. If only something could be done to give her some power of abduction and flexion of the thumb, it would help her, but the flexor muscles are pretty weak. However, he has not been able to decide on even attempting anything in the operative line as yet. He feels it necessary to keep on guard against doing meddling surgery.

If he thought the condition would be progressive, he would advise transplanting two of the hamstrings to the patella, so that she could continue to walk better. That operation is remarkably successful in the poliomyelitis cases. Unfortunately, he did not know the exact condition present when he operated on the little girls, but he feels that they are doing well enough to be let alone for a little while.

Dr. Ralph C. Hamill asked Dr. Ryerson what would be left of the hamstrings if he transplanted them into the quadriceps.

Dr. Ryerson replied that the semi-tendinosus would be left. In many of the poliomyelitis cases the gastrocnemius is left, which acts as a flexor when the leg is held fixed.

Dr. Hamill asked if the vaso-motor condition was pronounced during the healing following the operation on the feet, to which Dr. Ryerson replied in the negative. The wounds healed very promptly, so far as he could remember. There was no infection, and the wounds were not slow in healing—no slower than in any ordinary child.

Dr. H. C. Stevens asked if there had been any sensory disturbances, to which Dr. Bassoe replied in the negative.

Dr. Lewis asked Dr. Bassoe upon what theory it is held that the peripheral part of the motor nerve is involved rather than the cell body in the spinal cord in the cases presented. The peripheral end of the motor axone would be involved rather than the entire axone.

Dr. Bassoe believes it has been the finding, in the few cases that have been examined at autopsy, that there has been a disproportionate amount of degeneration in the fine ramifications of the motor nerves. The nerve trunks have been normal, and the changes in the anterior horn cells have not been marked, that is, not marked enough to account for the atrophy. It seemed to be a disturbance rather of the end organs.

In regard to prognosis and chance of further improvement by surgical treatment, if one compared the present deformities with the stationary stage seen after acute poliomyelitis, it would be easy to see how improvement could be made, but it should be remembered that in poliomyelitis we are dealing with a disease that has run its course, and the muscles that are good will remain so, but in the cases shown it could be prophesied, with a fair degree of certainty, that the muscles which are not affected to-day are going to be affected later on. In the older girl, for instance, the quadriceps extensor is now beginning to get very weak, while it is still strong in the younger girl. While the biceps and other hamstring muscles are very good this year, they are not likely to be good four or five years from now. So, even if the biceps were sewed into the quadriceps tendon, it might not be able to contract the tendon after a few more years.

However, it was very gratifying to see how the operation on the feet has improved their shape and the ability to walk.

Dr. A. B. Yudelsohn wished to speak regarding a remark made by Dr. Ryerson, namely, that he did not see why the thumb did not oppose or flex as well as the rest of the fingers. We know that the opponens pollicis muscle in the human being is the first to disappear in a process of degeneration, according to the laws of physiology.

Dr. J. C. Gill asked Dr. Bassoe the connection between cases of so-called neuritic atrophy and progressive muscular atrophy. It is not possible that both are due to primary disturbance in the cell body, one of severer type than the other?

Dr. Bassoe, in closing the discussion, said, in answer to Dr. Gill's question that, as he understands it, in progressive muscular atrophy of spinal origin we have a definite relation between the number and quality of anterior horn cells and the degree of atrophy. On examination of the cord we find that the cell groups corresponding strictly to the atrophied muscles are destroyed, but this has not been found in cases like those demonstrated. The changes in the muscles, both the atrophy and the interstitial changes, as well as the interstitial neuritic changes, are altogether out of proportion to the destruction of cells in the anterior horns. You may have a group of perfectly normal anterior horn cells and yet find atrophy of the corresponding muscles.

Translations

VEGETATIVE NEUROLOGY, THE ANATOMY, PHYSIOLOGY, PHARMODYNAMICS AND PATHOLOGY OF THE SYMPATHETIC AND AUTONOMIC SYSTEM

BY HEINRICH HIGIER

WARSAW

Authorized Translation by Walter Max Kraus, A.M., M.D.
[New York].

(Continued from page 369)

It has been shown experimentally (Fleischmann) that thyroid extract has a detoxifying action upon atropin, which may be easily shown on the heart which has been stimulated to stoppage by muscarin.

The chemical nature of the substance which stimulates the nerves and metabolism in Graves' disease is a thyreoiido-globulin (Oswald Gottlieb). The manifestations of stimulation of the sympathetic system, which may be designated "adrenalin symptoms," point to a sensitization of definite sympathetic structures for the action of the adrenalin which is always present in the blood. Thyreoiido-globulin would therefore, analogously to cocaine, increase the irritability of the sympathetic nerve endings towards an adequate stimulation by the hormone of the adrenals.

While, in one instance, the vagotonic tendency may be the basis for a definite neurosis, in another it may modify in a definite fashion the progress of various organic diseases of the body. This applies to the relatively infrequent cases of tabes dorsalis where at the very onset visceral disturbances or crises (hypersecretion, increased peristalsis, sweating, epiphora, incontinence of feces, etc.) are in the foreground. It is precisely these patients who have a preëxisting vagotonic condition.

The prettiest example of a slowly developing vagotonia is Addison's disease, a condition from which general pathology has made many observations. In this disease, it is a question of a picture

(emaciation, diarrhea, low blood pressure, hypoglycemia) whose origin lies in the disappearance of those organs from which spring the most important excitor of sympathetic impulses.

Early tuberculosis strongly recalls, both in its beginning symptoms and in the accompanying lymphatism, the Addisonian disease, since the chromaffin system, which in Addison's disease is found to be entirely destroyed, is damaged electively by the tuberculosis endotoxin.

Among the dermatoses, vasomotor urticaria and Czerny's infantile exudative diathesis appear in individuals, or in families with vagotonic tendency.

In mental diseases as well, the observations of Pötl, Eppinger and Hess have shown that at the height of a severe psychic disturbance the equilibrium of the visceral nervous system is destroyed. The pharmacodynamic reactions of the autonomic and sympathetic systems to specific drugs is characteristically changed during psychic diseases (climacteric melancholia, manic-depressive insanity). Pötl's cases of catatonia were carefully studied in this connection. In the acute cases, Rheinhard's cortical edema was found, which Pötl regards as probably due to stimulation of the autonomic nerves to the choroid plexus. This episodic over-reactivity of the vagus system of catatonics is partly a tendency, partly the disease itself, and recalls many of the conditions in the reaction of anaphylaxis.

In many sympathicotonic individuals, adrenalin glycosuria, or adrenalin midriasis (Loewi's reaction) occurs.

What may yet be said in regard to the discussion of the pharmacodynamics and of the pharmacology of the vegetative system in regard to the question of the interrelations between the sympathetic and the glands of internal secretion, and in regard to that action of the glands of internal secretion upon the psychic functions?

The degree of emotional reactivity is of course not only influenced by the activeness of the mental state, and by the reactivity of the vegetative system, but also by the quantity and quality of the products of the glands of internal secretion, which directly or indirectly, by means of their action upon the sympathetic system, influence the psychic functions.

What has been heretofore said yields, in the light of Munzer's summary of the subject, the following conclusions: The pathological changes of the secretions of many endocrinous glands—thyroid, pineal, hypophysis, sex glands—cause definite psychic manifestations (as for instance in Graves' disease, myxedema, acromegaly, castration) which lie essentially in the realm of affective life.

A series of physiological conditions, among which puberty, pregnancy, menstruation, and old age may be mentioned, are frequently accompanied by a modification of the affective process, and at the same time, by an alteration of the normal secretions, of some glands (sex glands and thyroid gland). Definite diseases which are intimately related to the condition of increased or decreased secretion of endocrinous glands not infrequently follow directly upon violent emotions. The objective signs of some emotional excitements (palpitation of the heart, sweating, mydriasis) are equivalent to a complex of symptoms as we see them shown in dysglandulism, as for example in Graves' disease, Addison's disease and eunuchoidism.

However we may think of the significance of the glands of internal secretion as etiological agents, the fact still remains that, on the basis of clinical observations, the influence of many of the products of internal secretions upon the manifestations of the affective life are undeniably established. But now a new difficulty arises: to appreciate as a real fact the causal relation between internal secretions and cortical activity. Even though to-day the old theory of the sympathetic is placed in the background in favor of other hypotheses, yet the fact of the close relationship between the glands of internal secretion and the sympathetic remains unchanged.

Many suppositions have been made concerning the mutual relationship of nerves and glands of internal secretion. Definite conclusions fail us. It has, however, frequently been pointed out that as the glands of internal secretion influence the sympathetic system, so, conversely, the sympathetic influences the glands of internal secretion. It has not yet been settled which of these two actions is the leader, nor to what degree one of the two serves to determine the function of the other. Most of the glands of internal secretion have a marked affinity for the central nervous system, as the psychoses of Graves' disease, acromegaly, diabetes, tetany, and Addison's disease show. This correlation, this relation one to another seems, as Münzer brings out, like that between two glands of internal secretion. When, as Münzer points out, two organs or organ groups, as the brain on the one hand and the polyglandular system on the other, are closely related, and obviously influence each other, there must be some similarity in the mechanism of their functions. "Just as the polyglandular system is influenced by products from the glands of internal secretion circulating in the blood, so there may be internal secretions produced by the central nervous system which regulate the action of definite cerebral functions."

As to the etiological significance of psychic traumata in diseases of the internal secretions, the clinical observations tell us that diseases which are definitely internal secretory in nature (Graves', acromegaly) may develop after such traumata. On the basis of these observations, Münzer believes that he may conclusively state that, in a certain number of these cases, the original injury is of cerebral origin, while the lesion in the glands of internal secretion is of secondary nature.

Physiological relations: From these statements, the theory that the glands of metabolism and internal secretion most probably have projection centers in the cortex presents itself. It is at all events for the future to demand, by means of experimentally obtained, intense emotional conditions in animals, as well as by autochthonous human mental diseases, a definite anatomic study of the endocrinous organs, including the secretory cerebral choroid-plexus, and the sympathetic nervous system. D. Bauer, relying on the researches and experiments of Katzenstein, Exner, Asher, and Fleck, and especially Weiner, has attempted to place on a firm basis the group of diseases designated the neurosis of the glands of internal secretion.

He states, reasoning from logical arguments, that, in conditions of general over-irritability and increased reactivity of the vegetative system, the secretory fibers to individual glands (the lachrymal, the nerves of the thyroid, the splanchnic nerves to the adrenals) are primarily stimulated and that thus this condition of increased tone in the sympathetic system may be followed by increased function in the organs which it supplies.

Since the endocrinous glands regulate the tonus of the nervous system, which, together with the general mixture of tissue juices, is known to be the active principle of that which we know as the constitution of the organism, we may be permitted to separate the neurosis of the glands of internal secretion from other organic neuroses.

They make up the transition between constitution and disease, and what at one time expresses itself as being a constitutional peculiarity may at another time, quantitatively increased and with an acute onset, present itself as a severe illness. Bauer's train of ideas is, as we see, in the main in agreement with that of Eppinger and Hess who speak of a vagotonic disposition of the organism, and a vagotonia, a disease.

The same holds good, on the whole, of other organic neuroses—heart neuroses, vascular, ocular, intestinal, respiratory and sexual

neuroses—which may easily arise in individuals with a general increased reactivity of the vegetative nervous system, when an organ or group of organs is truly exceptionally vulnerable and reactive, or when a locus minoris resistentiae has resulted from some previous organic disease with consequent related involvement of the same, and related psychic manifestations.

The justification of the existence of the conception of vagotonia and sympathicotonia has been repeatedly tested during the last few years. The most important question may, in my opinion, be stated as follows: May clinical medicine expect anything of practical worth from the newly, but not firmly established physiological conception, and from the pharmacodynamic examination of the vegetative nervous system in their relations to conditions of tone in the body?

A synthesis has been accomplished in defining the disease picture of vagotonia which is undoubtedly ingenious and stimulating, even though it is undoubtedly a somewhat forced schematization and has not been confirmed by all the researches upon it.

The most fruitful thing in contemplating the whole subject lies in the great significance of hormones in the development of somatoneuroses in the various systems of organs. It is a question, in organic neuroses, bronchial asthma, gastric neurosis, mucus colitis, phrenocardia, vascular crises, sympathetic neuralgia, etc., of a disturbance in the neuro-dynamics of the innervators of the various organs, whether this be brought on by a disturbance of metabolism or by some other stimulation of the nervous system.

As we have seen from the previous general data (the special pathology follows below) we have here an almost entirely new and yet untouched field of investigation which may simplify our estimate of many pathological conditions which it has been customary to describe falsely as special forms of disease.

This new branch of neuro-pathology, visceral pathology, may perhaps, as is usual, lead to hasty or schematic conclusions, since the clinical material by which the clinical facts were established has not been any too large. It now becomes the duty of experimental pharmacology to investigate diseased conditions in relation to clinical observation, and to clarify both normal and pathologically altered functions of organs. The drugs are like tuning keys by which we may tighten a string in that complicated string instrument, the organism, in order to increase its vibrations, or on the other hand to loosen it in order to decrease its activity.

It now becomes a question of whether the clinical observations

and the results of the tests of function really confirm the assertions about the functional system diseases of the autonomic system, particularly in the case of the diametrically opposed conditions of the two fundamental conceptions (autonomic and sympathetic). The material examined thus far has, as is usual in nosology when new syndromes spring up, shown that the conception of vagotonia is capable of much expansion, that it shows many exceptions to the rule, that all cannot be brought in line with the pharmacological scheme, that the selectiveness of certain hormones is limited and that mixed and transitional forms between the two main groups (autonomic and sympathetic) are not lacking. In brief, the two conceptions are passing through the same evolution, as for example tabes, multiple sclerosis, Graves' disease, paralysis agitans which to-day may be diagnosed without any of the etiological, pathognomonic or so-called cardinal clinical symptoms of their discoverers.

The theoretically exact and carefully worked out antagonism between the two groups may be regarded as an excellent schema which, however, cannot invariably be put to a practical application. Even if it be beyond doubt, says Bauer, that there exists a functional antagonism between the sympathetic system in its narrow sense, and the remaining autonomic system (the autonomic), and even if the two may be separated in their development, it must yet be emphatically stated that the systems worked out from physiology and anatomy are not entirely identical to those based upon pharmacological actions, and that the antagonism between sympathetic and autonomic does not appear the same physiologically as it does pharmacologically. The selectivity, the selective tropism of drugs upon the vegetative system demands restriction. In the same way: as pharmacodynamic testing of function does not affect all parts of the vegetative system equally, but brings out the wide dissociation of the individual actions of the neurotropic substances, as also does the physiological, mainly tonic, innervation fail to bring out increased reactivity in all parts supplied by the vegetative system, but manifests itself in the most widely varying combinations.

Other investigators have expressed analogous opinions (Falta, Newburgh, Nobel, Petré and Thorling).

Bauer believes that there is but one recurring physiological condition which may truly be called vagotonic, namely sleep. It is characterized "par excellence" in a condition of over-activity of the autonomic system—narrowed pupils, slow pulse, tendency to sweat and to pollutions, attacks of asthma, colic-like attacks, crises of labor pains. "The fundamental basis of this phenomenon

('Night is the time of smooth muscles'—Schmidt) is," Bauer concludes, "as yet unexplained."

In my opinion, the vagotonia of sleep is to be explained in the main by the fact that the cross-striated musculature is at rest and the blood goes more to the unstriated muscle which, being better nourished, functions more actively.

Bauer advises justly when he urges that the investigation of the conception of vagotonia by drugs should be amplified and controlled by mechanical and physical procedures.

The most important and best known mechanical and physical methods of investigating functions are those which will be described in the special part in connection with the heart, lungs, vasomotors and sweat glands, and which include the demonstration of dermographismus, pulsus irregularis respiratorius, Aschner's reflex from pressure on the eyeball, Czermak's vagus pressure phenomenon, Erben's pulse phenomenon, and Veraguth's sweat phenomenon.

The best pharmacodynamic method of investigating function is by means of adrenalin, atropin and pilocarpin. The investigation should be planned methodically, as follows:

A. Conjunctival installation and subcutaneous injection of 1 per cent. adrenalin.

B. Subcutaneous injection of adrenalin $\frac{1}{10,000}$ for every kilogram (2 2/10 lbs.) of body weight three hours after the ingestion of 100 grams of grape sugar, in order to determine the tolerance for dextrose.

C. Injection of atropin sulphate $\frac{1}{10,000}$ for every kilogram (2 2/10 lbs.) of body weight, to test the autonomic system.

D. Injection of pilocarpin hydrochloride $\frac{1}{1,000}$ per kilogram (2.2 lbs.) to test the autonomic system.

The original investigations of Eppinger and Hess were carried out with smaller doses, pilocarpin 0.01 (gr. 1/6), atropin 0.001 (1/64 gr.) and gm. 0.001 of adrenalin. The later investigations of Petrén and Thorling and of Bauer were carried out with still smaller doses: pilocarpin gr. 1/6–1/12, atropin gr. 1/128 and adrenalin gr. 1/64–1/128.

(To be continued)

Periscope

Journal of Mental Science

(Vol. LX, No. 248)

1. The Complement-Deviation in Cases of Manic-depressive Insanity. LEWIS C. BRUCE.
2. Influence of Toxins on the Central Nervous System. D. ORR and R. G. ROWS.
3. Importance of Disturbances of Personality in Mental Disorders. R. G. ROWS.
4. Pupil and its Reflexes in Insanity. A. H. FIRTH.
5. Clinical Significance of Katatonic Symptoms. HENRY DEVINE.

1. *Complement-deviation in Manic-depressive Insanity.*—In a series of observations in cases of manic-depressive insanity, with the idea of demonstrating toxic etiology, Bruce used urine as antigen and serum as the immune body. He found that the urines of cases of the depressed phase have a greater complement-deviation power than the urines of cases "in a state of elevation," and that the antigen is always more or less present in various stages of the disease. The writer did not consider the test of diagnostic value as "the urines and serums of cases of acute insanity other than manic-depressive insanity will deviate up to 2 M. H. D. of complement with the urines and serums of cases of undoubted manic-depressive disease."

2. *Influence of Toxins on Central Nervous System.*—After stating their conclusions from former investigations of the mode of action of toxins on the central nervous system, *i. e.*, "(1) that the lymph path of nerves is an important mechanism of brain and cord infection and (2) that in all probability general paralysis and tabes dorsalis are lymphogenous infections," Orr and Rows discussed their findings in the spinal cord of a bacterial intoxication, the toxi-infection being caused by the introduction into the abdominal cavity of rabbits of celloidin capsules containing staphylococcus pyogenes aureus. They found upon post-mortem examination (1) that the most highly developed structures, the nerve cells, suffered least of all; (2) there was primary degeneration of the myelin sheath around the cord margin and along the postero-median septum; (3) that the myelin degeneration was greatest in the upper part of the cord; (4) there was edema of the cord; (5) the perivascular neuroglia was actively proliferating; (6) the vessels were dilated and congested, were hyaline and contained thrombi of the same nature.

They were inclined to the opinion that these represented not only degenerative changes but were also due to changes in the sympathetic system.

3. *Disturbances of the Personality.*—Rows describes in detail two women who developed in middle life psychoses characterized by ideas of changed personality and accompanied by marked sexual and religious trends. After analyzing these cases and discussing the literature bearing on the subject, he concludes that ideas of changed personality develop as a result of disturbance of the apperceptive function. The latter is intimately related to the organ-sensation which in turn may be affected by variations in the autonomic and sympathetic nervous systems. In view of the writer's experiments, one of which appears in this number of the JOURNAL, he is inclined to suggest that toxins acting upon the sympathetic system may in the end "play an important

rôle in producing those mental disorders in which a change of the personality is a prominent symptom."

4. *Pupil and its Reflexes in Insanity*.—An extensive continued paper difficult to abstract briefly and finished in this number. Pupillary disturbances, more or less marked, are described as occurring in many varieties of mental abnormality, the diagnostic significance in general paralysis and syphilitic and other organic conditions being recognized. A series of twenty-three tables gives the detailed statistics upon which many of the findings are based.

5. *Significance of Katatonic Symptoms*.—Devine, after describing and analyzing two cases, one of which he calls katatonic stupor and hysterical disassociation, the other probably mixed form of the manic-depressive psychosis, concludes as follows:

(1) Katatonic phenomena occur in a variety of mental disorders and are not necessarily significant of deterioration.

(2) The existence of actual confusion is significant of subsequent dementia, and the demonstration of this condition affords a valuable prognostic sign.

(3) A prognosis cannot always be made on a purely symptomatological basis.

(4) The course of the symptoms is largely dependent upon the make-up of the personality and that no true estimate of their value can be made without reference to the reaction type or mental constitution of the individual.

The paper is followed by considerable discussion which shows that a dementia præcox controversy still exists in Great Britain.

(Vol. LXI, No. 252)

1. Position of Psychiatry. Rôle of General Hospitals in Its Improvement. C. HUBERT BOND.
2. Interpretation of Dreams According to Sigmund Freud and Others. F. ST. JOHN BULLEN.
3. Drug Addiction in Relation to Mental Disorder. ROBERT ARMSTRONG-JONES.
4. Friedrich Nietzsche. HUBERT J. NORMAN.
5. Hereditary Transmission of Epilepsy. M. ARDY COLLINS.
6. Family History of Insanity in the Highlands. T. C. MACKENZIE.
7. Crime, Alcohol and Other Allied Conditions in Staffordshire. M. HAMB-LIN SMITH.

1. *Position of Psychiatry. Rôle of General Hospitals in its Improvement*.—Bond defends psychiatry from the charge that as a branch of general medicine it "lacks sustaining interest," is "apt to side-track its devotees into blind alleys" and so forth. He shows the necessity for all practitioners to have some knowledge of mental diseases and that for those who would make the study of psychiatry a life work there is a wealth of problems awaiting solution. It is true that medical work in "asylums" has been unpopular, largely due to the scarcity of well-paying positions and the undesirable status of the assistant physician. This unpopularity may be overcome by increasing the salaries and providing separate houses for assistant medical officers, by the institution of diplomas in psychiatry; by the establishment of psychiatric clinics; by increasing the importance of psychiatry in the medical curriculum; by endowments for research by philanthropists; by the establishment in general hospitals of mental outpatient departments and special wards.

Psychiatric clinics would go a long way toward mitigating the stigma of insanity, providing teaching facilities and opportunities for research work.

2. *Interpretation of Dreams.*—Bullen describes the Freudian theory of the interpretation of dreams and enters into a critical discussion of the same. He is inclined to take issue with the emphasis made upon the sexual, but says that one should remember an essential difference between the people of England and Germany in that the latter have a precocious sexual life which influences the statements of the Austro-German school of neurologists. The writer closes by saying "the truth may well be sought in the mean course. The attitude towards Freud least just and to ourselves most unprofitable, is that of unqualified disparagement or indifference; his is one of the greatest and most ingenious psychological minds of our time; it is only necessary to allow for a certain exuberance of imagination, fertility of explanation, and arbitrariness in inference."

3. *Drug Addiction in Mental Disorder.*—Using forty-one cases as a text for his paper, Armstrong-Jones emphasizes the drug-taking habit as a cause of insanity and a public danger. The victims are mostly among the cultured, the artistic and the best brain workers of the community. This is preventable and the restriction of the sale of dangerous drugs is urgently needed.

4. *Friedrich Nietzsche.*—Norman attempts to show, by quotations from various writers on the life of Nietzsche, that the latter, on the basis of a neurotic temperament, had recurrent attacks of insanity of the nature of manic-depressive psychosis characterized at times by elation, at other times by marked depression. These varying moods naturally influenced him in his philosophy and have colored his writings. The diagnosis of Nietzsche's mental state is further complicated, however, by four "apoplectic fits," one at the age of 45, another at 54 and the third at 56, a fourth at 57. Following the first "apoplectic fit" he "had no idea of the value of money," was evidently euphoric and called himself by the names of various historic or notorious persons. From this time on, there was a steady mental deterioration until his death from pneumonia at the age of 58. The deterioration was accompanied by unsteadiness of gait and alteration of handwriting. The above symptoms suggested to some general paralysis of the insane, but in Norman's opinion, the long duration is much against this diagnosis as is also the previous history of "nervous instability," while "it is quite in accordance with what we know of the terminal dementia associated with intermittent insanity" (basing this apparently on Stoddart, *Mind and its Disorders*). In the light of the above, the writings of Nietzsche should only be considered in connection with and with due regard to the accompanying mental state.

The article closes with the views of some other writers regarding Nietzsche's mental state.

5. *Hereditary Transmission of Epilepsy.*—Collins found in 177 cases an ancestral history of defect in 57 per cent., in over 32 per cent. the defect was alcoholism in the parent or grandparent; in 22 per cent. it was epilepsy in the family; in 12 per cent. it was insanity in the family.

In the second series of 420 cases, 320 males and 100 females, 50 per cent. showed a defect in ancestors or collaterals, 44 per cent. of these being parental alcoholism, 46 per cent. epilepsy and 45 per cent. insanity, a number showing more than one factor. Only 78 were married, there being a total of 197 living children, of which only five are recorded as epileptics.

6. *Insanity in the Highlands.*—Mackenzie analyzes the admissions for four years, 613 cases, in 226 of which a definite history of heredity was obtained. He concludes that a comparatively small number of families and individuals within the district is responsible for a relatively high contribution "to the admissions to the hospital." He also claims a very small percentage of general paralysis, out of an asylum population of 700 there being only six cases, all males, all of whom had spent many years out of the Highlands.

7. *Crime, Alcohol and Allied Conditions*.—After considering the criminal statistics for three years of Staffordshire a county with a total population of over 900,000, Smith makes the following deductions:

1. Alcohol is directly responsible for more than half of the male prison receptions, and for a much larger proportion of the female receptions.

2. Densely populated areas give the highest proportion of alcoholic offences. This is especially the case where the workers are ill-paid and particularly where much female labor is employed.

3. A high rate of alcoholic offences is usually, but not invariably, accompanied by a high rate of non-alcoholic offences, and by a high rate of crimes of violence, of pauperism and insanity.

4. That there is no very marked relation between pauperism and crimes against property.

W. C. SANDY (Columbia, South Carolina)

MISCELLANY

PELLAGRA. C. T. Nesbitt. (Journal A. M. A., Feb. 26, 1916.)

The author gives facts and figures indicating that sanitary measures and disinfection have little influence on the incidence of pellagra, according to the local experience in his city. He sums up his conclusions as to its etiology in the following: "There is no existing relation between soil pollution and the incidence of pellagra. 2. Close supervision of all cases, disinfection, fumigation, isolation and the other usual means of controlling infection have no influence on pellagra incidence. 3. Business depression, lack of employment, a limited market for products and increased price of food, with consequent increase of indigence, increase the incidence of pellagra very definitely."

PARESIS. U. J. Wile and P. H. de Kruif. (J. A. M. A., Feb. 26, 1916.)

This is an account of the cultural experiments made by them with the *Spirochæta pallida* derived from the parietic brain. Wile has recently described the successful inoculation of rabbits with spirochetes from this source and in their further experiments carried on over four months the organism has been brought through three successful subcultures, at the end of which time it is as actively motile and abundant as at first. The question of a neurotropic strain with certain morphologic characteristics has been suggested by others, and this is supported by some clinical evidence. In their organism as isolated they found no demonstrable morphologic differences. It is worthy of note, however, that the cultures grew much more slowly and less luxuriantly than those cultivated from the early cutaneous or mucous membrane syphilids; on the other hand, it is also to be noted that they are extremely viable, even in the original cultures after disturbance by frequent examination and transplantations.

SYPHILIS OF THE VERTEBRÆ. C. C. Wholey. (Journal A. M. A., Feb. 26, 1916.)

After noticing the infrequency of reports of syphilitic disease of the vertebræ the author gives the history of a patient in whom, with the symptoms of compression of the spinal cord, the Roentgen findings and a suspicious history, though the positive Wassermann is not mentioned, gave rise to the diagnosis of syphilitic vertebral disease. The case was an example of the varied symptoms that may be thus produced and it yielded to the anti-syphilitic treatment. While the condition of the patient when observed was decidedly threatening, in a short time—at least in a few months—he was able to return

to his regular occupation, at which he was still employed a year and a half later. The case is one which illustrates a class in which a final decision as to diagnosis has rested on clinical findings in the face of negative laboratory reports.

OVERACTIVITY IN NERVOUS DISEASE. Alfred Gordon. (*Journal A. M. A.*, Feb. 26, 1916.)

The nonuniformity of symptoms in different cases of certain nervous diseases is noted by the author who has analyzed 187 cases of nervous affections as regards this point, with special reference to the etiology of the disease. He has found that in tabes the functional disorder may show itself first in the upper or lower extremities, in the ocular symptoms, and that the sphincters may be involved early or late in the disease, that paresis, which is most frequent in persons who exercise their intellectual more than their physical functions, has been seen to manifest itself in four of his juvenile cases, at the beginning of a college course, that muscular atrophy may begin in either lower or upper extremities and also in adult cases of poliomyelitis, and that pernicious anemia may follow spinal cord disease or be unaccompanied by any nervous symptoms whatever. He quotes Edinger's theory that these things may be due to excessive functioning of the nerve cells in one region or another, and applies this to the diseases mentioned. He has analyzed his cases in the light of these facts. In thirty-seven cases of occupation neuroses he found facts that convinced him that the occurrence of the trouble in any particular segment was due to a predominance of effort practiced by the affected region. The symptoms of lead paralysis, sixteen cases of which were observed, showed a local predominance in parts that are more specially in use and in poliomyelitis, progressive muscular atrophy, pernicious anemia, paresis and tabes, the analysis brought out similar conditions. The exhaustion view, as he calls it, is supported in all these disorders and the observations point to a very important feature in prophylaxis. Bearing in mind this pathologic potentiality in cases of chronic toxemias, early treatment of the latter combined with the removal from the usual occupation at the earliest possible moment, will be an aid to the prevention of such local manifestations. The recognition of this fact of the relation of overactivity and exhaustion of groups of nerve cells seems to be of far-reaching importance.

MORPHIN HABIT. C. E. Sceleth, Chicago. (*Journal A. M. A.*, March 18, 1916.)

The author gives a more comprehensive description of the method outlined in *The Journal A. M. A.*, March 13, 1915. He claims that the method is original and easily applied, and essentially rests in the formula: scopolamin hydrobromid, 1/100 gr.; pilocarpin hydrobromid, 1/12 gr.; ethyl-morphin hydrochlorid, 1-2 gr.; fluid extract cascara sagrada, 15 min.; alcohol, 35 min.; water qs. ad, 1 dram. The amount prescribed and indications for its use vary with the case. Patients given to the use of more than 10 grains of morphin a day are given 60 minims of the mixture every three hours for six days, reduced to 30 minims on the seventh day, to 15 minims on the eighth and on the ninth day 15 minims given only three times during the day. On the tenth day this mixture is discontinued and tonic treatment begun. Addicts accustomed to the use of less than 10 grains of morphin a day and more than 5 are started with a dose of 45 minims, reduced in a similar manner on the seventh day, while to those who are taking less than 5 grains daily only 30 minims are given as an initial dose. The dangers of the method are trivial, the author says. Scopolamin delirium occurs in about 4 per cent. of the cases, and if this happens the scopolamin may be omitted for a few doses and begun again in smaller quantities. The greatest danger is collapse, due

to the morphin withdrawal, and if the pulse falls below 40 or goes above 120, the mixture is stopped and the patient given morphin in one-third-grain doses every fifteen minutes until results are obtained. If with the treatment above described the pupils are dilated and react normally on the third or fourth day, the outlook is good. The rationale of the combination is that scopolamin hydrobromid is one of the atropin series, but unlike atropin it is sedative and is a less dangerous drug. Pilocarpin acts at the same point as does scopolamin, but in an antagonistic way and is used to combat certain undesirable by-effects of the scopolamin. Ethyl-morphin hydrochlorid (dionin, Merck) serves merely as a substitute for the morphin withdrawn. By the fifth day, as a rule, the patient's desire for morphin is gone, and, as the patient's strength admits, graded exercises, outdoors if possible, are used to improve his physical condition and to acquire the fatigue which is the best antidote to the insomnia which is the symptom most likely to persist. In about 2,500 cases, Sceeth has used one or two modifications of the method: that of giving morphin to avoid collapse, and the other the quick reduction method carried out as follows: "The patient, when first presenting himself, is given one-half of his accustomed dose of morphin distributed over twenty-four hours. On the following day the amount is halved, being administered at the accustomed time. The next day one-eighth of the usual amount is given; after which morphin is entirely discontinued. During this process of reduction, the scopolamin mixture is administered as previously outlined." Since the enactment of the Harrison law this seems to him more justifiable than formerly. Old age is no bar to treatment by the method described. Heroin cases should be treated in the same way. For opium addicts, 30 minims of the mixture should be administered every three hours and the ethyl-morphin hydrochlorid reduced to one eighth grain per dose. For cocain addicts, 15 minims of the mixture every three hours without the ethyl-morphin hydrochlorid for three days. It is always safe to discontinue cocain used alone, as there is never any danger of collapse. Certain phases of chronic morphinism present different problems, such as patients first seen in collapse after long enforced abstinence or after misdirected treatment elsewhere. Morphin and cardiac stimulants here are no longer of avail. Delirium tremens is another serious complication. As regards recurrences, if the individual does not coöperate with the cure through moral weakness or otherwise there is not so much hope of prevention. The difficulty of obtaining morphin nowadays helps. No plan of therapy, however logical or successful, can insure absolutely against recurrence in weak-willed individuals.

EPIDEMIC MENINGITIS. Josephine B. Neal. (*Journal A. M. A.*, March 18, 1916.)

The most common two mistakes in serum treatment of epidemic cerebrospinal meningitis are, according to the author, the giving of too few doses of serum after the first improvement from one or two injections, and failure to persist with the injections if the improvement is very slow. It has been the experience of the New York Department of Health during the past five years that it is rarely safe to give less than four doses of serum on consecutive days, even if the improvement clinically is very rapid and the organisms disappear from the fluid after one or two injections. An average case usually requires from four to seven injections, and puncture for the relief of pressure may have to be done several times during convalescence, and a little serum may be then injected if a large amount of fluid is withdrawn. In from 3 to 10 per cent. of cases, a large number of injections may be necessary. Three cases recently treated are reported as illustrating these facts. She does not claim that autogenous vaccines have been used in a sufficient number of cases to definitely determine their value, but it is the

custom of the department to use them in cases that tend to become chronic, and in a number they have seemed to be beneficial. It has been the experience of the department that doses larger than 20 c.c. need to be given with very great caution, even if large amounts of fluid have been withdrawn. Relief of pressure is itself of considerable value. As has already been referred to by Dubois and Neal, considerable prognostic importance is attached, in the cases reported, to the reduction of Fehling's solution. A more extended study of this point is being made. The general treatment is also of great importance. Hexamethylenamin is given as a routine and certainly to prevent cystitis if there is retention, as is often the case. The eyes, mouth, skin, bladder and bowels must all receive careful attention, and if the patient is delirious or restless, sedatives, preferably opium, must be used. Feeding is most important, and the greatest patience must be exercised to induce the patient to take even a little nourishment. Swallowing is often very difficult. Feeding by rectum was resorted to for a while in one of the cases reported.

FACIAL NERVE PARALYSIS. J. Ramsay Hunt. (Journal A. M. A., March 18, 1916.)

Recurrent paralysis of the facial nerve and its relation to the so-called facioplegic migraine are treated by the author. The interest in these cases is in the frequency of the occurrence of facial palsy in the afflicted individuals and the pathologic tendencies favoring the predisposition. Severe pain is a frequent precursor and accompaniment of the paralysis. Rossolimo has suggested an etiologic relationship with migraine, and postulates a facioplegic type of the latter, similar in nature to the ophthalmoplegic variety of Moebius which occupies so established a place in literature. Hunt disagrees here with Rossolimo's views. Migraine and facial palsy may exist together; both are sufficiently common affections. He reports three cases of recurrent facial palsy accompanied with pains in one of which there was an apparent paternal heredity. It is, he considers, merely a peripheral paralysis of the seventh nerve with a peculiar tendency to recurrence. Some weight may be placed on the theory of narrowness of the stylomastoid foramen, as suggested by Despaigue, which might predispose the nerve to compression from very slight inflammatory causes. This needs definite pathologic confirmation. Occasionally diabetes has coexisted, and this possibility should be considered. Most of the cases are of infectious or refrigeration origin. Such terms as periodic facial palsy and facioplegic migraine are misnomers.

NAUSEA OF PREGNANCY. J. C. Hirst. (Journal A. M. A., Feb. 26, 1916.)

Hirst here reports his experience with the use of corpus luteum extract in the nausea of pregnancy. His employment of the extract was based on the presumption that there is more than a coincidence between the formation and disappearance of the corpus luteum of pregnancy and the cessation of the nausea. It is not unreasonable, he thinks, to suppose that there is sufficient absorption from the corpus luteum to account for the disappearance of the nausea, especially when one realizes that the nausea begins to diminish at the time when the corpus luteum is most fully developed in pregnancy. Acting on this idea, he has been giving it hypodermically in doses of 1 c.c. daily, which he thinks is probably too small. His experience, however, has been encouraging, every patient having improved by the hypodermic injection, intramuscularly in every case but one (80 per cent.). While the one failure shows that it cannot always be depended on, the results so far have been better than with any form of treatment, and with larger doses it may be still more efficacious.

Book Reviews

MYTHS AND LEGENDS OF ANCIENT EGYPT. By Lewis Spence. Frederick A. Stokes Company, New York.

It is with a feeling of disappointment that one lays down this volume, so attractive in outward appearance. The author's preface prepares us somewhat for this, it is true. His efforts to forestall criticism express themselves in a strange tone of aggrieved vindication of his knowledge and right to speak with authority on mythology and Egyptology.

He has an extensive synoptic knowledge of things Egyptian. His attitude of approach places him in line with the later genetic explanations of racial origins, religious unfoldings and the like. Yet this is only to a very superficial extent. Even where he has differed somewhat from theories of other most recent authorities his originality carries him but a little way into the truly interpretative.

The book contains a great deal of valuable material brought together in convenient and readable form. But there is a dispiriting sense of want of that vital vision which has of late entered into the study of mythology and the science of Egyptology as well and which penetrates to the motive dynamism which throbbed abundantly beneath Egyptian life and produced the marvelous wealth of history, religion, art, all the abundance of outward expression now disinterred from the intervening centuries for our enlightenment in the profound understanding of human thought and life.

The descriptive collection of this variety of inheritance, which makes this a valuable handbook of Egyptian lore, contains a presentation of the extensive polytheism of these people most comprehensive in the number of gods described and the long succession of historical periods they represent. Numerous examples of literature illustrate Egyptian attainment in that field. Perhaps the last chapter devoted to Egyptian art and its influence is one of the most valuable.

It may be ungrateful to Evelyn Paul to raise any objection to the charming plates in color which she has furnished to be inter-spersed among the many other illustrations more truly Egyptian. They add indeed to the external appearance of the book and seek to express that shadow mystery which Spence characterizes as enveloping Egyptian art. They seem, however, an intrusion where the very uniqueness of color and outline, resting upon a substantial foundation from which their artistic work seems to spring and with which they peculiarly make it blend, represent this mystery and subtlety in a manner no modern art can copy. It is the author himself who calls our attention to this.

It is not, however, the popular style in illustration or in text that prejudices, as the author feared, but the fact that the sounding line so rarely drops into the depths.

BRINK.

MODES OF RESEARCH IN GENETICS. By Raymond Pearl. The Macmillan Company, New York.

It would seem at first sight that the value of this book is chiefly negative. It attacks the various methods employed in the experimental study of heredity in order to reveal their inadequacy and ineffectiveness. These are the bio-

metric ideas and methods, and the gathering of statistical knowledge in order to understand heredity and control it in experimental breeding.

The author has, however, a further than a merely destructive purpose in his criticisms. He is a practical experimenter and investigator and seeks to put this work in general upon a more logical basis. He emphasizes the fact which early enthusiastic advocates of these methods overlooked, that they are merely descriptive and can have scientific validity only as they are grounded in vital biological principles and facts, which lie beyond the various means which aid in discovering and understanding them. In other words, he insists upon the fundamental background of reality, the true recognition of which frees scientific as well as all other workers from the traditions which too often keep the attention fixed upon the external and static and make of the means an end. The actual value of these methods, once grasped without this confusion, will prove itself in the vast field of experiment and accomplishment in the breeding of both plants and animals. The fact that in the latter field much has been accomplished without a knowledge of the principles of heredity in no way discounts the value of a fuller understanding and application of the laws and principles.

JELLIFFE.

BIOLOGY AND SOCIAL PROBLEMS. By George Howard Parker, S.D. Houghton Mifflin Company, Boston and New York.

This book gives permanent form to several lectures delivered at Amherst College as a series of the William Brewster Clark lectures. They present man's relation to his environment in reference to the problem of "social control."

There are two distinctively important aspects, the author says, in which man reveals his relation to his surroundings and which must be the object of our understanding and intelligent control. First through his nervous system, from its lowest reflex activity to its highest functional development, he is capable of continuous responsive action extending to the highest order of intelligence. In the second place he has the power through reproduction of perpetuating his race, which can inherit his acquisitions and continue that developmental change which has made his life possible.

One lecture concerns itself with the nervous mechanism which enables man to accomplish his adjustment to environment and effect a progressive evolution. It is simply expressed for the lay student but with a directness which eliminates all cumbersome detail and shows in clear fashion the forms of nervous activity and their anatomical bases. There is a tendency to emphasize the purely physical structure as the source of mental life, to the exclusion of a more comprehensive view of the personality, as is evidenced in the limitations the author sets somewhat to many present day conceptions of memory.

Yet in this his attitude is one of open research and investigation and he emphasizes in a suggestive manner the significance of functional activity as above that of structure.

This same spirit characterizes the entire book, which is occupied further with the biological importance of hormone activity, and a likewise clear discussion of fundamental problems of reproduction and inheritance and their application to social evolution.

The directness of style makes the book a valuable contribution to elementary scientific literature.

JELLIFFE.

Notes and News

Obituaries

ALOIS ALZHEIMER

Alois Alzheimer died the 19th of December, 1915, after an illness which began with his removal to Breslau, the last scene of his labors, three years before. His career had been one of untiring activity in the field of psychiatry distinguished by a variety of definite achievements, particularly in pathological anatomical research.

He was born in France in 1864. At the age of twenty-four he became assistant physician in the insane asylum at Frankfurt-on-Main. Here he took Nissl's place later as physician of second rank at the institution. In 1903 he joined Kraepelin at Heidelberg and a little later went with him to München, where he qualified as lecturer. In 1912 he became professor of psychiatry and neurology at Breslau.

His work with Nissl laid the foundations of his chief contribution to psychiatry. Together they introduced into psychiatry vital, productive methods for the old fruitless ones, through the creation of the histology of mental disease, of a pathological anatomy in this territory that had not before existed. These two investigators worked together in the employment of these methods. Alzheimer's interest lay particularly in the practical application of these researches to actual psychiatric problems. He sought to find a unified anatomical basis for unified clinical pictures. His scientific work had always this ultimate purpose, to render definite clinical service. His microscope, as he stated it, stood at the service of psychiatric advance.

The study of the processes of cerebral atrophy interested him particularly. Arterial sclerosis of the brain first claimed his attention and he sought to distinguish it from paralysis on one hand or simple senile dementia on the other. His pathological work best attained its unifying purpose in the investigations of general paresis, the results of which were published in his inaugural thesis in 1904 when he entered upon his position of lecturer, a work which is classic, "Histological Studies in the Differential Diagnosis of General Paresis." The typical condition of the non-nervous tissues and the infiltration processes have become well known and have estab-

lished the differential diagnosis of general paresis from other diseases which had been confused with this. The histological problems connected with those diseases then presented themselves to his attention and still offer an important field to his successors. He has published many lectures and papers on general paresis, as well as descriptions of special, unusual forms of organic processes in the cortex. His name has been given by Kraepelin to one form of presenile dementia with a characteristic anatomical basis.

His clinical activities embraced the study of alcoholic disturbances and of epilepsy. The pathological anatomy of the latter occupied him also as well as that of idiocy and chorea. He sought moreover, to discover the histological conditions in the so-called simple or functional mental disturbances which would be of assistance in diagnosis, particularly in dementia præcox and certain acute psychoses. He revealed the unsuitableness of the histological methods of research in these disturbances and sought to discover their pathology through a study of the decomposition products which are formed in status epilepticus, by severe infection and intoxication deliria, in catatonic periods of excitement and the like. This also was part of the work interrupted by his illness and death.

Alzheimer's work was based upon his institutional and clinical experience. He had the true spirit of research which always expected results and worked definitely toward them, a confident optimism which not only accomplished its end but discovered new ways, when necessary, of obtaining them. This determined creation of new methods has given to psychiatry more refined and more advanced histological facilities than those at the command of neurology or of other branches of medical research. It was his purpose to perfect histological research in the field of neurology with the material which would be at his disposal at Breslau, another task which he has bequeathed to his pupils.

He was a man of firmness, endurance and independence of character, qualities which he displayed in his work. He had the capacity for keeping details well in hand and arranging them systematically with his vision always directed to the general purpose of the whole. This distinguished his work in the laboratory as well as his contributions through publication or lecture. His work was of the sort that is always progressive, developing, therefore it could not be finished but must remain as a legacy to those who received his training and inspiration. He left within a few months of completion a work on which he had long been engaged, a "Pathological Anatomy of Mental Diseases" intended as a handbook of psychiatry.



ALOIS ALZHEIMER



GAETANO PERUSINI

He was the founder of the *Zeitschrift für die gesamte Neurologie und Psychiatrie*, which at the time of his death he conducted in association with Lewandowsky, who says of him that his name was "the best prospectus and the best introduction for the new periodical."

The death of Alzheimer comes with a special sense of loss to his many pupils among the leading psychiatrists in America. München was the scene of much of their student work abroad, and it was to this earnest and optimistic investigating spirit that they owe much of the inspiration in their studies as well as a thoroughly grounded anatomical knowledge as a basis for psychiatric work. His charming, sincere personality likewise endeared him to them and combined a warmth of personal feeling with the appreciation of their debt to his stimulating scientific leadership.

SMITH ELY JELLIFFE

GAETANO PERUSINI

No more striking instance of the irreparable tragedy of the European war presents itself than in the untimely death of Gaetano Perusini. The friendly collaborator with leading investigators in the German psychiatric schools, his death was the result of a wound received at the hands of the ally of the German nation. He was injured in November at S. Floriano by the bursting of a shell discharged by the Austrian artillery while performing his duties as medical officer (*Capitano Medico, Primario del Manicomio Provinciale di Milano*). He was taken to the hospital at Cormons, which had been established for the wounded in his own corps and there he died December 8, 1915.

Perusini was born at Udine in 1879 and although he died at so early an age had already distinguished himself throughout the world of psychiatry and neurology by the character and scope of his work. The seriousness and earnestness of purpose with which he devoted himself to his work were manifested even in his early school days at Udine. His father, also a skillful physician, was his inspiration and model. In 1895 he entered upon the study of medicine at Rome, where he took his degree at the age of twenty-two. He already showed an aptitude for scientific research. He became assistant first in the psychiatric clinic and then assistant instructor in the clinic of nervous and mental disease at the University of Rome, and physician in the *Manicomio* of Mombello.

He began to publish the results of his studies the following year

after receiving his degree. He published widely in the journals of various countries, by which he became better known in regard to his work than even in his own land. He had been a pupil of Nissl, Alzheimer and Schumann and was later their valued friend and fellow worker. For this reason many of his publications are preserved in German rather than in his own tongue. His work was characterized by its originality and by the brilliancy of his personality. He possessed a profound critical sense as well as an extensive culture, with which he combined the seriousness of purpose which made his work of distinct value for the advance of psychiatric knowledge.

His contributions comprise the study of degenerative characters, studies in cretinism made in conjunction with Cerletti, researches in the domain of neuropathology, on the cremasteric reflex, spinal localization, myotonic syndrome and deaf-mutism. His most distinguished service, however, was his recent work in pathological anatomy on the spinal cord and the cortex in mental disease. The most important contributions in this field were those which he published on the *sclerosi tuberosa* and concerning the early forms of senile alteration in the brain.

His publications cover various other subjects besides. In 1904 he published a paper on infantile-juvenile paresis. A number of papers on histological researches have been printed in German or French. He was one of the most valued contributors to the *Rivista di Patologia nervosa e mentale*.

The same genuine sincerity that marked his scientific spirit led to his unselfish devotion to his wounded countrymen when war came. It distinguished also the manner in which he met his death. During a period of alternate hope and despair as to the final outcome of his injury he failed neither in courage nor in serenity of mind, accepting without complaint the early sacrifice of his career. The field of neurology and psychiatry has, however, suffered the loss of an earnest and brilliant worker, whose future held much of promise.

SMITH ELY JELLIFFE

MARTIN BERNHARDT

The death of Martin Bernhardt in Berlin, March 17, 1915, at the age of seventy-one, removed a figure of sterling worth in the history of the establishment of neurology in its place in medicine. Bernhardt had devoted a long and active life to unwearied research and

to imparting the results of his work to others in the service of his specialty. His facilities for original work were limited by circumstances due in large part to the slow recognition accorded to neurology as a department of clinical research. Bernhardt's own unflinching interest, however, overcame these obstacles to a large degree. He was somewhat limited even in his opportunities for teaching but imparted to his pupils a stimulus and inspiration largely through the encouragement which he gave to their own individual work.

Bernhardt was born in Potsdam. His early research work was begun in Königsberg, immediately after his student days, when he worked with Nothnagel and Jaffé under Leyden. These early investigations were occupied with the effects of phosphorus poisoning and in work upon the spinal cord. In 1869 he removed to Berlin and worked with Westphal in the Charité Clinic, in which service he developed extensively the treatment of nervous diseases. He himself established a polyclinic which contained one of the first clinics for nervous diseases. Berlin continued the scene of his activity and research through the remainder of a long life. He was appointed Privy Medical Counsellor and Professor Extraordinarius at the University of Berlin. He was also one of the editors for thirty years of the *Centralblatt für die medicinischen Wissenschaften*, to which office he brought a wide knowledge of literature to which he continually added, as well as a judgment both sound in its criticism and ready in its appreciation of the work of others.

He published extensively the results of his investigations and practical experiences, in many branches of his subject. In 1880 a text-book made known the results of his work on electrotherapy and electrodiagnosis. In 1891 there appeared a monograph on brain tumors, a subject in which he had published occasional other articles, as he had also in regard to spinal cord affections. Another important work of his was a publication on apopleptic attacks in tabes. One of his later publications, which manifests the modern alert spirit of his investigations, was a monograph on the occupational injury befalling telephone operators.

His favorite field of research, however, and the one in which he rendered most signal service was that of the peripheral nerves. This territory occupied him from his earliest years until his death. He published during the seventies a number of contributions on peripheral paralysis and also worked on neuralgias and cramp-like conditions in this region. In 1895-97 the results of his work were published in two volumes, a second edition in 1904, "Diseases of the Peripheral Nerves," which occupied a place in Nothnagel's *Hand-*

book of *Special Pathology and Therapy*. This work is marked by his masterly handling of his material, clearness and firmness of presentation and his minute literary knowledge.

His knowledge of the peripheral nerves was turned to account in his later service when the war had brought many injuries to the peripheral nerves. His text-book already referred to was of so modern a character that it has proved of eminent service here. One of his latest contributions to literature was an excellent article in the *Berliner klinische Wochenschrift* on these injuries, while his latest service was given to surgical work upon them.

He was a very modest man, but cheerful, with a fund of humor, and particularly the friend of the young. He added much to the genial, social spirit of the Berlin Society for Psychiatry and Neurology, to the upbuilding of which he had contributed much. He was for many years its treasurer and had been twice its president. It was both with pride and with regret, Rothmann tells us, that he saw its funds, which he had long carefully gathered and guarded, diverted to the needs of war.

Bernhardt was one of the last of the early school of Berlin who developed neurology in the later decades of the last century. His activity and his interest belonged not merely to the past. They were unfailing and therefore kept him abreast of the development which it had been his in large part to initiate and to further, and made his a service that meets the needs of the present day, and prepares the way for further research. At the café meetings following the regular monthly society meetings of the Berlin Neurological Society, Prof. Bernhardt was an active spirit and the writer well remembers meeting him at these meetings during the winter of 1908-1909 where his eager and well-informed interest in the work of our American neurologists was a striking evidence of his alertness and critique. He was keen on Hunt's syndrome at this time and was particularly well posted on the American work. He was extremely catholic in his appreciations and free and frank in his expressions concerning our work.

SMITH ELY JELLIFFE

The Journal OF Nervous and Mental Disease

An American Monthly Journal of Neurology and Psychiatry, Founded in 1874

Original Articles

HYPERPLASIA OF THE PINEAL BODY¹

BY HOWARD H. BELL, M.D.

Few lesions of the pineal body have been observed. Symptoms attributable to abnormalities of the pineal body have been observed only with an increase in its size and in most instances have been due to regional pressure, though in a few instances associated metabolic manifestations have been attributed to this organ.

In man the pineal body, or epiphysis, appears as a single evagination from the hinder part of the roof of the diencephalon. This outgrowth Marburg (1) claims soon branches as a compound gland and becomes invested with a capsule contributed by the choroid plexus; from the choroid plexus penetrating blood vessels carry in connective tissue septa. The pineal body develops rapidly and reaches its greatest growth at the fifth or sixth year. Beginning at about the seventh year, and ending at about the fourteenth year there occur certain well-recognized changes spoken of as involution of the pineal body. After involution is fully established no further changes in its development have been observed.

The adult pineal body possesses a connective-tissue capsule from which septa pass into the substance of the body; these septa branch and join other septa thereby dividing the pineal into multilocular compartments containing the cells of the pineal. This uniform arrangement of islands of pineal cells almost surrounded by septa is the more usual type of pineal; nevertheless it is not exceptional to

¹From the Department of Pathology of Washington University Medical School, St. Louis, Mo.

find the stroma broken up into small strands of connective tissue distributed among the cells of the pineal separating individual cells and small groups of cells. In fact the two varieties may be observed in the same pineal.

Krabbe (2) was able to divide the normal pineal into four types in accordance with the arrangement of the connective tissue. To the first group belong those with rather regularly formed islands of cells and rather sparse septa. To the second group belong those in which the septa are enormous in extent being equal to one half the cells of the pineal. To the third group belong those in which the cells of the pineal and the supporting tissue are so confused in arrangement that the picture is quite chaotic. To the fourth group belong those in which the septa are extremely vascular. Each epiphysis may, however, show in different places different conditions and in some places may present the appearance of a transition.

In the pineal body there is a preponderance of fairly large cells; these cells usually have a large oval nucleus, with but little chromatin which is arranged chiefly at the periphery and often contains a nucleolus. There is little cytoplasm. Not infrequently there is found a cell with a divided nucleus. In addition to this type of cell, there is a smaller cell which has all of the characteristics of neuroglial cells. It has a round or oval deeply staining nucleus. The protoplasm is scant and in many instances undistinguishable on account of the intimate relationship to the neuroglial fibers. There are many cells of an intermediate character which prevent a sharp differentiation between the two types of cells described.

Concerning the character of the cells of the pineal body there are different opinions. Krabbe after studying a hundred examples of human pineal of both sexes, of all ages except between the seventh and fourteenth years on account of lack of material, concludes that there are two types of cells: the first, special pineal cells and the second, neuroglial cells. Krabbe believes the cells of the pineal consist of non-neuroglial cells and a small number of neuroglial cells which give off a very large number of fibers which intersect other cells. Jordan (3) as the result of his work upon the sheep believes the entire body, exclusive of the vascular pial trabeculae and a few white nerve fibers, is composed of more highly differentiated, or neuroglial cells with fibers, and less highly differentiated, or interneuroglial cells of the original ependyma of the third ventricles. He described the neuroglial cells as providing a network of neuroglial fibers in the meshes of which are found the interneuroglial cells. These interneuroglial cells show some variation in size and shape and

sometimes give rise to short neuroglial processes. He concludes that they are all one type of cell.

By involution is designated the changes occurring between the seventh and fourteenth years which are characterized by proliferation of connective tissue, the formation of neuroglial plaques which may at times contain cysts, and the appearance of concretions. The capsule thickens and the septa become widened and relatively conspicuous, particularly where several septa come together. Just how much this change alters the general architecture of the pineal will depend largely upon the primary relationship of the connective tissue to the cells of the pineal. The cells of the pineal lie free in islands between the septa, though Krabbe has emphasized the observation that a few cells may sometimes be caught in the thickening septa and thereby come to lie within them. There occurs a deposition of neuroglia about the blood vessels, so that small masses or plaques are formed. While the formation of plaques is acknowledged as one phase of involution, Marburg recognized this tendency toward neuroglia deposition about the blood vessels even in the newly born.

The presence of cysts within the pineal body was observed by Virchow and other writers of his time. However more recent observers have found small cysts within the pineal body with sufficient regularity to justify the claim that cyst formation is a part of normal involution. The course of development of these cysts has been described at some length by Marburg. He divides cysts in the pineal body into two types according to their pathogenesis. To the first type belong those cysts which are the result of central softening of previously formed neuroglial plaques. To the second type belong those cysts having their origin in a portion of the primary evagination which has become included in the pineal body. These are not particularly infrequent in the normal pineal and as a rule are situated somewhat toward its attachment to the wall of the third ventricle.

The neuroglial plaques, already alluded to, have their origin in the vicinity of penetrating blood vessels. As the deposition of neuroglia along the blood vessels increases in extent and density, it manifests the tendency to contract and finally strangulate the vessel, whereby the nutrition to a particular part is entirely cut off with the result of subsequent liquefaction of the more central constituents. These cysts appear in section usually as round, oval or elliptical, though it is not uncommon for them to be irregular, their shape depending somewhat upon the plane through which they are cut.

The second type of cyst formation in the pineal body is not a

part of involution, although a brief description may serve to differentiate these cysts from the cysts of softened neuroglial plaques. They are usually lined with ependymal cells which may at times become flattened and resemble endothelial cells. Not infrequently these cells are in part absent. Where wholly absent the remaining cyst may become indistinguishable from those resulting from softened neuroglia. While this confusion might arise concerning their origin, it is evident that the nature of the fluid content is strikingly different, representing on the one hand dissolved tissue and on the other hand cerebrospinal fluid.

Furthermore, certain homogeneous acidophile bodies make their appearance with involution. They are usually round or oval, not infrequently appear to be laminated and at times have a scalloped border. They have often been designated as colloid or amyloid bodies. It is not uncommon for them to become infiltrated with calcium salts giving rise to the so-called brain sand in the pineal. These bodies occur among the cells and sometimes in the septa. According to Krabbe pigment, which he designated lipochrome, is found in the pineal cells, free in the connective tissue and in the cells with divided nuclei. Fat has been found in the septa.

By using Van Gieson's or Mallory's connective tissue stain the capsule and septa take a distinctly lighter stain than that of the adjoining meninges: where the septa are the thickest the collagen fibers are more deeply stained, but in the middle of such places at times the fibers have disappeared, the structure is lost and a finely granular material which remains takes a slightly basic stain. Krabbe designates this material myxomatrix.

No medullated nerve fibers have been demonstrated in the normal pineal body. I have employed Kulschitzky's modification of Weigert's stain for myelin sheath.

In the two following cases lesions of the pineal body have been observed. The changes have been in part similar to those occurring with involution and have caused tumor-like enlargement of the pineal body.

CASE I.—The patient, a man, thirty-three years old, was admitted to the Barnes Hospital a few hours before his death.

He complained of swelling of his feet and ankles, shortness of breath, a colicky feeling and coughing upon exertion. These symptoms have occurred at intervals for the past four years. The patient has always been well until the onset of his present illness. He is married and has two healthy children. His mother died at the age of 45 years with dropsy.

Physical examination shows that the patient was well nourished

and well developed. There was no abnormality of the genitals. Pericardial impulse was visible and there was a wide area of cardiac dullness. The patient was much cyanosed.

It is of interest that the urine reduced Fehling's solution. The urine was of a light brown color, turbid, acid and contained a trace of albumen, a few white blood cells and epithelial cells. There was no opportunity to make other tests for sugar and a quantitative analysis of the urine.

Autopsy.—The body is that of a fairly well-nourished white male adult. The skin, especially over the head, is cyanotic. The scrotum is edematous and there is moderate edema about the ankles.

The pericardium is distended by about 250 c.c. of straw-colored clear fluid. The heart weighs 635 grams and is enormous in size and the auricular appendages are distended and erect. The heart is soft and flabby. The auricles communicate by an opening about 3.5 cm. in diameter; the interauricular septum is represented by a crescentic fold above and anteriorly. The auriculo-ventricular valves are represented by two characteristic openings about 4 and 4.5 cm., guarded by enlarged leaflets which hold water introduced through the aorta and the pulmonary artery. The mitral leaflets are thickened at their distal borders. The ventricular chambers, especially the right, are enormously enlarged. The aorta is small, measuring 1.9 cm. in diameter, while the pulmonary artery measures 3.5 cm. The pulmonary arteries contain patches of intimal thickening which in places have undergone atheromatous change. The right auricular appendage contains a small thrombus.

The right lung is bound above by old adhesions to the chest wall. Below the apex externally there is an area of consolidation about 2 cm. across. At the hilum are found two caseous and calcified lymph nodes. In the left lung along the anterior border of the lower lobe is a small area from which pus-like fluid can be pressed. A triangular portion of the lower anterior part of the lower lobe is collapsed and firm. At the external border is a cheesy nodule about 1 cm. across.

The liver weighs 1,455 grams. The surface is yellowish brown and on section the centers of the lobules are red and the peripheries are yellow.

The spleen weighs 245 grams. The capsule is opaque and thickened. Small white pearl-like bodies are plentiful on the cut section.

The right kidney weighs 150 grams and the left 155 grams. Removal of the capsule leaves a smooth dark red surface. The organ is firm and the cut surface is a dark reddish brown color.

The suprarenals are studded with numerous yellowish nodules projecting upon the surface.

The pancreas weighs 80 grams and appears to be normal. No abnormality of the pancreas was observed on microscopical examination.

The brain is adherent in many places to the dura which over the right hemisphere is removed with difficulty. The arachnoid is edematous and lifts from the pia rather easily. No other abnormality was found.

Anatomical Diagnosis.—Partial absence of the interauricular septum; hypertrophy and dilatation of the heart; thrombus in the right auricular appendage; old pleural adhesions; chronic pulmonary tuberculosis; tuberculosis of bronchial lymph nodes with calcification; chronic passive congestion of viscera.

The pineal body is found to be enlarged but in normal relation to the adjacent structures. There is no evidence of inflammatory change about the pineal or of pressure upon the neighboring brain tissue. It is pyriform in shape measuring 16 mm. long, 8 mm. broad and 5 mm. from above downward. It is found to be the site of



FIG. 1. Showing the enlarged pineal body with cysts (Case I).

multiple non-communicating cysts which vary in diameter from microscopic to about 5 mm., the largest cyst being situated in the basal part (Fig. 1).

Microscopical examination of the pineal body shows in certain localities the usual arrangement of islands of pineal cells partially surrounded by septa. In other localities a somewhat chaotic arrangement of the supporting tissue in relation to the pineal cells is observed. An occasional band of fibrous tissue resembling a sectioned septum makes its appearance. The septa in places are strikingly vascular.

Various neuroglial plaques containing cysts of different shapes and sizes occur at intervals. These cysts are usually round, oval or elliptical, though they may be at times irregular in contour. Neuroglia of variable thickness from almost nothing to a millimeter or

more in width form the walls of the cavities. The neuroglial fibers are usually arranged circularly. In contact with the cystic cavities the neuroglia is fragmented and there is a loss of structure. Sometimes the neuroglia is well preserved and gives a smooth lining, but none of these cysts are lined with cells. The contents are somewhat granular and take a slightly acid stain. These plaques of neuroglia end rather abruptly at their periphery though a few fibers go to the

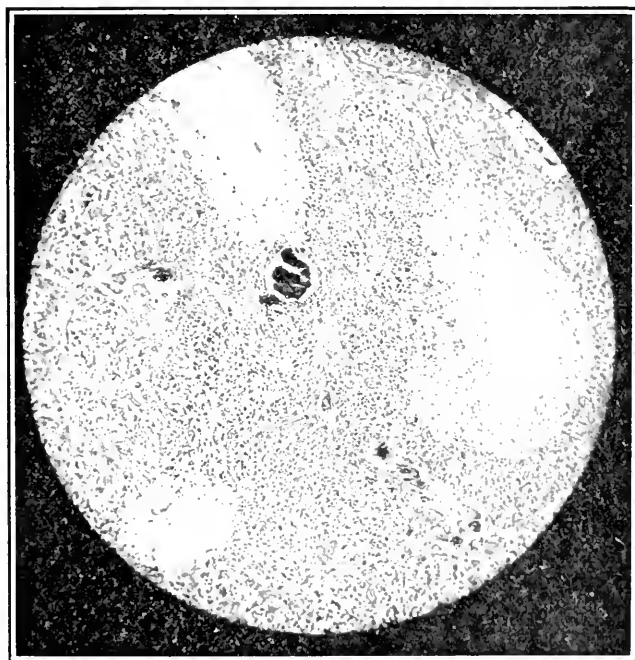


FIG. 2. Showing cysts in the pineal body surrounded by a zone of neuroglia (Case I).

adjacent cells and the adjacent connective tissue septa. In a few instances a small wedge-shaped process of neuroglia extends from the plaques a short distance into the surrounding pineal tissue, but it becomes frayed out and soon lost (Fig. 2).

The predominating cells of this pineal body are round or oval and have as a rule but little cytoplasm. The nuclei are vesicular; the chromatin is collected in masses at the poles or periphery of the nucleus. It is not uncommon to find a nucleus with a nucleolus. Cells with divided nuclei are occasionally seen. These cells in most instances are in intimate contact with neuroglia fibers which appear to pass through them (Fig. 3). In addition to the above type of

cell there is a smaller neuroglial cell with inconspicuous cytoplasm which is continuous with neuroglial fibers. It is not possible to distinguish sharply between the two varieties of cells because there are many cells of an intermediate character. Concretions are fairly numerous; some of them have a scalloped border.

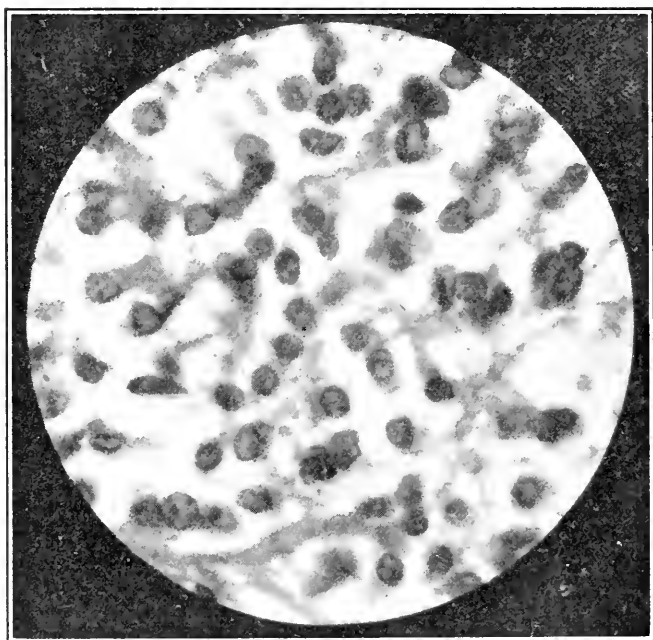


FIG. 3. Showing the character of the pineal cells and the relation of the neuroglia fibers to the pineal cells (Case I).

CASE II.—The brain after removal was brought to the laboratory and no history or protocol was obtainable.

The pineal body is somewhat egg-shaped measuring 15 mm. long and 9 mm. in its other dimensions. The organ is firm and the cut surface appears dense. No evidence of compression of adjacent structures can be discovered. No adhesions of any character are observed about the pineal (Fig. 4).

The usual arrangement of islands of the pineal cells partially surrounded by septa is present, although in most localities the septa are represented by bands of connective tissue which separate individual pineal cells and small groups of pineal cells. This intercellular tissue resembles the septa in staining qualities though numerous neuroglial fibers are scattered throughout. An occasional neuroglia plaque, containing a microscopic cyst, is seen. Laminated

bodies with scalloped margins are fairly plentiful and are frequently infiltrated to a greater or less degree with calcium salts. The predominating cells are fairly large, are round or oval and exhibit considerable uniformity in size; cytoplasm in most instances is unrecognizable on account of the intimate approximation of the inter-

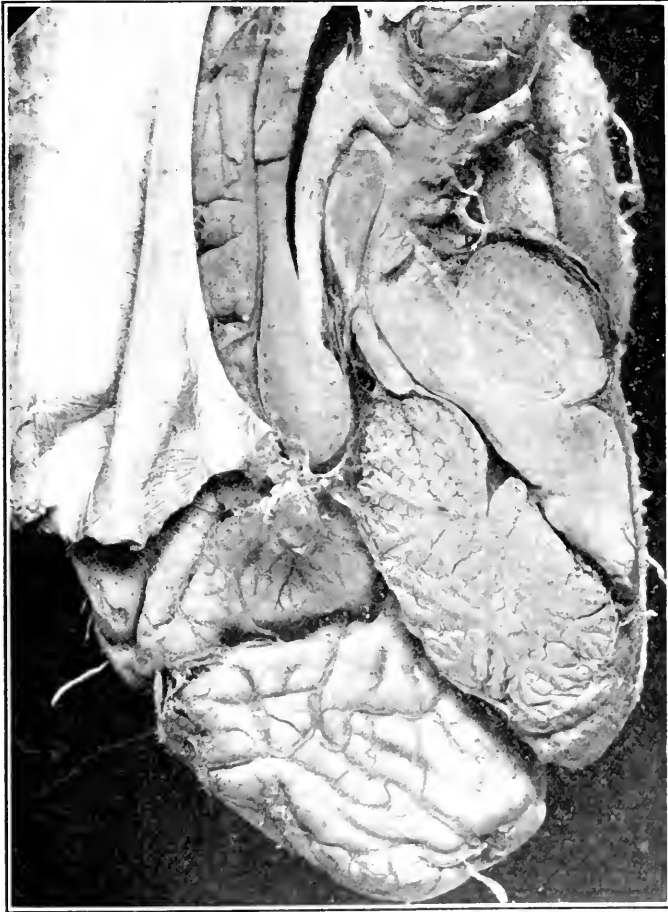


FIG. 4. Showing the enlarged pineal body torn from the wall of the third ventricle and still attached to the falx cerebri (Case II).

cellular tissue about the nuclei. The nuclei are vesicular and the chromatin is collected in masses mostly at the poles or periphery. Occasionally a double nucleus is seen within a cell which has a very narrow rim of cytoplasm. Nucleoli are not infrequently found. There are a few smaller cells with round or oval nuclei which

stain deeply. These cells have the characters of neuroglial cells and are intimately connected with neuroglial fibers. White fibrous connective tissue cells are found within the septa and occasionally in the connective tissue dividing the cells into groups.

Ziegler (4) makes the statement that the most common abnormalities of the pineal body are hyperplasia, cyst formation and psammoma but does not discuss these lesions in detail. Hyperplasia according to Marburg should not be confused with true hypertrophy of the pineal body in which there is a distinct increase in the size of the pineal cells. Marburg (5) has carefully described an instance of hypertrophy and hyperplasia chiefly of the neuroglial cells with gliosis of the pineal body; the brain was greatly enlarged and there was hypertrophy of glial cells and hyperplasia of neuroglia throughout the brain. Virchow (6) described briefly an instance of hypertrophy of the pineal in which the cells were abnormally large. Blanquinque (7) has described a case in which the pineal was about 2 cm. long and was made up of small cells which with connective tissue composed the principal part of the enlargement. Concretions and globules of amyloid were present. Blanquinque does not claim that the individual cells were larger than normal pineal cells but designates the condition hypertrophy. It is not improbable that several lesions described as glioma are identical with those in Cases I and II. Virchow was of the opinion that many of the so-called glioma of the pineal body represented a hyperplasia of the pineal cells; the cells in these tumors being similar to pineal cells. Lawrence (8) described a case in which the pineal measured 14 mm. in transverse and antero-posterior diameters and flattened from above downward measured 7 mm. There was an outer zone composed of cells of considerable size having large oval deeply stained nuclei. The cells of this layer were evidently pineal cells. The central zone was composed of finely granular material staining slightly. An open network of delicate fibers was seen in many parts of the central zone. No cells or nuclei were present in this zone. Between the two zones in the anterior part of the pineal body was a third zone consisting of a close network of very delicate interlacing fibers and scattered cells of small size. This layer was closely connected with the central zone on the one hand and on the other hand was not sharply marked off from the pineal tissue at the periphery, but was prolonged into the pineal tissue cutting it up into well-defined areas. Lawrence thinks that the enlargement of the pineal is due to a gliomatous growth which has undergone softening.

Reports of cases of abnormalities occurring at the site of the

pineal body have certain similarities. These growths are sharply circumscribed, they do not infiltrate the surrounding tissue, do not metastasize, and are as easily detachable as the normal pineal body. These enlargements advance in the line of least resistance into the third ventricle, often producing by pressure over the Sylvian aqueduct internal hydrocephalus. Microscopically the enlarged bodies are not strikingly different from the normal pineal and are usually composed of cells like normal pineal cells and stroma. At the same time there is more or less gliosis and new formation of fibrous tissue.

The normal pineal body varies greatly in size. I have measured the pineal bodies of a series of forty-five brains. The shortest measured 6 mm. in length and the usual length was 8 or 9 mm., although one measured 12 mm. and the longest 15 mm. The usual width was from 5 to 8 mm., although one measured as little as 3.5 mm. and another as much as 11 mm. The depth ranged from 2 to 6 mm., though in most instances it was 3 or 4 mm. Where one dimension was noticeably increased it was in most instances at the expense of another. Nevertheless one or two pineal bodies in this series were fairly large but retained the normal shape and appearance. The pineal body of Case I under discussion measures 16 mm. long, 8 mm. wide and 5 mm. vertically—being thereby equal to more than three times the size in cubic millimeters of the average normal pineal body. Case II measures 15 mm. long and 9 mm. in its other dimensions, thereby being equivalent in cubic millimeters to more than 6 times the average normal pineal body.

In Case I the enlargement of the pineal body is brought about by increase in all the pineal elements that make up the pineal body, namely neuroglia, connective tissue and pineal cells. The presence of cysts increases the size of the body. The pineal cells are in intimate relation to neuroglia fibers and various transitions occur between this type of cell and the smaller neuroglia cells. In Case II the cysts are microscopic in size and infrequent. The pineal is larger than in Case I and there is greater hyperplasia of the elements which compose it. Pineal cells are especially abundant and have the characters of those found in Case I.

Duffin (9), Raymond (10), Ziemmer (11) and Carl Hart (12) have described as glioma, glial-sarcoma or angio-sarcoma tumors from 3 to 5 cm. in diameter in large part composed of cells having the characteristics of pineal cells. C. M. H. Howell (13) has described three similar tumors. The relation of these lesions to hyperplasia is not determined. Furthermore, cysts in the pineal body up to several centimeters have been described.

The symptoms which have occurred with enlargement of the pineal are fairly constant. General symptoms as headache, vomiting and optic neuritis are almost constant. Languor, mental apathy and sleepiness occurred in the cases reported by Ogle (14), Coats (15), Frankl-Hochwart (16), Gutzeit (17) and Duffin. Extreme thirst and hunger were observed in two cases reported by Howell and in the case of Daly (18). Howell points out that symptoms of pineal tumors in consequence of the position of the pineal body are equivalent to lesions involving the mid-brain and corpora quadrigemina and are characterized by ocular palsies, vertigo, staggering gait, tremors and deafness to which may be added pain and rigidity in the neck and sometimes definite *opisthotonus*. The patients of Duffin, Ogle and Daly had rapid loss of vision. Howell suggests that internal hydrocephalus with pressure on the chiasm causes blindness.

Pineal tumors have occurred, with few exceptions, during childhood or in early adult life. In the cases reported by Ogle, Frankl-Hochwart, Huebner (19), Gutzeit, Marburg (20), Oestreich and Slawyk (21), the age was not above ten years and, save in one instance, the patient was a boy. In four instances the tumor was a teratoma. In addition to signs of intracranial tumor these individuals showed psychical and physical development beyond their years and there was excessive growth of the body. The bones and external genital organs with pubic hair were abnormally developed and the voice became deep. Marburg's patient was a girl of nine and a half years old; her genital organs were normal but there was adiposity particularly noticeable in her breasts and over the abdomen. Marburg maintains that the pineal has a definite function at least in early life and explains its relations to the lesion as follows: Premature genital development he regards as hypo-pinealism, universal adiposity indicates hyper-pinealism and cachexia is the manifestation of a-pinealism. Howell hesitates to assign the symptoms which have been mentioned to lesions of the pineal body.

It is noteworthy that the urine from Case I reduced Fehling's solution but further evidence of the presence of sugar was not obtained. Garrod (22) reported a case of diabetes mellitus occurring in a boy aged 16 years. A pea-sized cyst was found in the pineal. The fourth ventricle and other parts of the brain were normal. The pancreas was unduly small and was found upon microscopic examination to be markedly fibrosed. In Case I the pancreas exhibited no abnormality.

Numerous investigators have endeavored to determine by experi-

mentation on animals the function of the pineal body. Extracts prepared by various methods have been administered. Dixon and Halliburton (23) injected an extract of sheep's pineal intravenously into anesthetized cats. They observed a fall in blood pressure which they showed was not due to cholin, as some investigators have claimed. Howell who has called attention to the symptoms which accompany tumors occurring in early life suggests that the pineals used in such experiments may have become functionless.

Various methods of extirpation have been practiced. Foa (24), after a brief study on pinealectomized cockerels, decided that some sexual precocity occurred. Recently Dandy (25) has removed the pineal from puppies from ten days to three weeks old. Following the removal of the pineal he observed no sexual precocity nor indolence, no adiposity nor emaciation and no somatic nor mental precocity or retardation. He states that his experiments have yielded nothing to substantiate the view that the pineal gland has an active endocrine function of importance either in the very young or adult. He finds that the pineal is apparently not essential to life and seems to have no influence upon the well-being.

Conclusions.—In none of the organs of internal secretion are there cells with characters similar to those of cells of the pineal body. The pineal cells in young individuals are similar in number and structure to those in pineal bodies of older individuals after involution is established.

Pineal cells are intimately related to fibers which resemble those of neuroglia and there are transitional forms between neuroglia cells and pineal cells. Pineal cells appear to be modified neuroglial cells.

In association with the process of involution there may be tumor-like enlargement of the pineal body characterized by proliferation of the pineal cells. In association with hyperplasia of these cells there is no functional disturbance in other organs of the body.

REFERENCES

1. Marburg, O. *Arb. a. d. Neuro. Inst.*, 1909, xvii, 217.
2. Krabbe, K. *Nouv. Iconogr. de la Salpêtrière*, 1911, Vol. 24, p. 257, 1 pl.
3. Jordan, H. E. *Am. J. Anat.*, Philadelphia, 1911-12, Vol. 12, p. 249.
4. Ziegler. *Lehrbuch der path. Anat.*, 4th ed., Vol. II, p. 613.
5. Marburg, O. *Arb. Neurol. Instit.*, Wien, 1908, 13, 14, p. 288.
6. Virchow. *Geschwülste*, Berlin, 1864, Vol. II, 5, pp. 148-149.
7. Blanquinque, P. *Gaz. hebdom.*, 1871, p. 532.
8. Lawrence. *Tr. Path. Soc.*, London, 1890, 1, 14.
9. Duffin, A. C., and Ferrier, D. *Tr. Lond. Clin. Soc.*, 1876, ix, 183.
10. Raymond, N. F. *Bull. de l'Academ. de Méd.*, Paris, 1910, Vol. LXIII, 3, S., p. 265.
11. Zenner. *Alienist and Neurol.*, 1892, xiii, 470.
12. Hart, C. *Berl. klin. Wochenschr.*, 1900, xlv, 2208.
13. Howell, C. M. H. *Proceedings Royal Soc. of Med.*, 1910, 3, Part 2.

14. Ogle, C. Tr. Path. Soc., London, 1899, 1, 4.
15. Coates, J. Tr. Path. Soc., London, 1887, xxxviii, 44.
16. Frankl-Hochwart. Deutsch. Ztschr. f. Nervenhe., 1909, xxxvii, 455.
17. Gutzeit. Inaugural Dissertation, Königsburg, 1896.
18. Daly. Brain, 1887-1888, x, 233.
19. Huebner, O. Verhandl. d. Gesellsch. deutsch. Natur. f. u. Aerzte, Leipz., 1899, lxx, Part 2, 2 Hälfte, p. 220.
20. Marburg, O. Wien med. Wochnschr., 1911, Vol. 58, p. 2617.
21. Oestreich and Slawyk. Virchows Arch. f. path. Anat., 1899, clvii, 475.
22. Garrod. Tr. Path. Soc., London, 1899, 1, 14.
23. Dixon and Halliburton. Quart. Journ. of Exper. Phys., 1909, xxxvii, p. 455.
24. Foa. Arch. Ital. de Biol., 1912, Vol. 57, F. 2, p. 233 (French). Pathologica, 1912, Vol. 4, No. 60, p. 445 (Italian).
25. Dandy, Walter E. Journ. Exper. Med., 1915, Vol. xxii, No. 2.

TYPES OF NEUROLOGICAL CASES SEEN AT A BASE HOSPITAL*

BY JOHN JENKS THOMAS, A.M., M.D.

BOSTON

In the autumn of last year it was my good fortune to be in charge of the medical division of the English Base Hospital in France, given over to the care of the first "unit" sent out by Harvard University. Though under the arrangement that was at that time in force my service at the hospital was not long, it covered most of the time of the severe fighting in September of last year, and I was also fortunate in having opportunities to see and hear of the work in other hospitals through the kindness of Sir William Osler, Dr. Gordon Holmes, and Dr. Colin Russell, of the Canadian Hospital, No. 3, and others. It must not be forgotten that in a base hospital near the front, cases are not allowed to remain very long, as a rule, as all seriously injured which require any length of time for recovery, are evacuated to England as soon as they are in condition to be moved, and therefore our knowledge of end results were obtained largely at second hand, and rather often our observations were limited by lack of opportunity for repeated careful examinations, such as are so frequently necessary for a full understanding of cases of disturbance of the nervous system.

In the cases we saw, gunshot wounds of the head, back and arms, on the whole, were quite frequent, probably due to the fact that most of them were received in trench fighting or when lying down in the open.

First, in regard to injuries of the large nerve trunks in the extremities. In a surprisingly large number of these injuries, the nerve is found not to have been divided, but merely contused by the missile, or rarely compressed by hemorrhage within or about the nerve trunk, or by edema of the surrounding soft parts. This was usually shown by the retention of some degree of sensation in the skin area supplied by the nerve, although the motor function of the muscles supplied by the same nerve was generally totally lost. At the base hospitals in England which I visited on my return, I learned that they had found the method of testing the nerve function by

* Read at the forty-second annual meeting of the American Neurological Association, May 8, 9, and 10, 1916.

means of electrical currents passing through condensers, as in the instrument manufactured by Schall, had enabled them to decide with great accuracy, after the lapse of three weeks from the time of receipt of the injury, the extent of damage to the nerve, and quite certainly whether or not it had been completely divided. As all wounds for practical purposes show some infection, aside from securing the ends of large nerve trunks which are obviously divided and exposed in order to prevent retraction of the divided ends, operations on nerve trunks are better postponed until the wound has healed. After the completion of healing, there are a large number of measures, both operative and non-operative, to be considered, as in case of injuries of nerves from other causes. Among the non-operative ones we may mention massage, passive and active exercises, and the use of various forms of electrical currents, baking, and such measures. Operative measures for late secondary suture of divided nerves, freeing them from scar tissue by dislocation of the nerve trunks, or by excision and suture or dissociation of the fibers when this lies within the sheath, are the most promising methods of repair, where this is possible, and occasionally nerve transplantations are useful.

Injuries of the spinal cord may be divided roughly into two general classes. First, and the most frequent, are those where the cord has been injured directly by the missile, or by fragments of the spine driven into it, which lacerate or compress it; and secondly, the cases in which we find softening of the cord or hemorrhages into its substance produced indirectly by the concussive effects of the projectile which merely touches the vertebral column, or by concussion without even this having happened. In these cases the bullet may pass through the body of the vertebra, or merely touch the spinous, articular or transverse processes. A number of autopsies have been made in these cases, and the condition in the spinal cord has been found to vary. Often there is a *hematomyelia*, either a single large hemorrhage or multiple smaller ones. More frequently still, however, there has been found an edematous swelling of the whole cord, with disintegration of its tissues, and central softening. At the first, practically all of these cases show a complete sensory and motor paralysis of the parts below the site of the injury, with loss of the deep reflexes, and this even where the injury of the cord has not been complete. In consequence the actual extent of the damage to the cord can be determined only when the immediate effects of the injury, and the contusion has had time to subside. In the early stage after an injury of the spinal cord has been received, the plantar reflex has proved to be a fairly reliable guide as to the severity of

the injury. In the severer cases, during the first two weeks, efforts to elicit the plantar reflex usually bring no response. In cases that are less severely injured a flexor response may be obtained. Most favorable of all are the cases in which there is present an extensor response to the sensory stimulation, the typical Babinski sign, often accompanied by a dorsiflexion of the whole foot or flexion of the thigh. Operation on these cases has proved disappointing in its results. Good X-rays are here indispensable to help us in deciding whether we may have continued pressure from missile or fragments of bone, and cases where this seems to be the case should be operated upon. Yet even in these cases, where the X-ray picture or even the operation itself showed very certainly continued pressure upon the cord, the result has been extremely disappointing, as the existence of pressure gives no indication of the amount or severity of the destruction of neural tissues. In addition, the risk of spreading infection through the meninges by operation is a very real danger which must always be kept in mind.

Two cases of wounds of the spine which came to our hospital showed complete motor and sensory paralysis, with retention of urine, and loss of all tendon reflexes and absent plantar, cremasteric, and abdominal reflexes.

Somewhat more promising was the following case of hematomyelia.

Oct. 2, 1911, C.-6-32. Hematomyelia at 11th thoracic segment. The man had been thrown into the air by the bursting of a high explosive shell, but received no wound. Since then has had constant severe pain in the small of the back, and incontinence of urine, and the feet and legs feel dead. On examination there was no paralysis, but very marked paresis of all movements of the feet and legs. Knee jerks and ankle jerks both increased and equal. No Babinski or Oppenheim reflex. Sensation to touch and pain diminished below a line two inches above the groin to the knees. Below the knees in the legs and feet, and on the back of the thighs and buttocks, sensation was much diminished.

In the following case there was an injury of the nerve roots of the cauda on one side only.

Sept. 28, 1915, C.-10. Injury of cauda, 4, 5 L. and 1, and 2 S. on left.

Wound from shrapnel over upper sacral region on the left, near the median line.

On examination there is marked weakness of the left external hamstring muscle, and of all the muscles of the left leg below the knee. Knee jerks equal and normal. Ankle jerk and plantar reflex lost on the left, and normal on the right. Partial loss of sensation for touch and pain below the knee in the left leg and on the posterior

aspect of the left thigh, but not extending onto the buttock. Sphincters were unaffected.

Injuries of the brain were quite frequent, and perhaps the most interesting points in connection with these cases, to one who has seen very few bullet wounds of the head, as is the case with most neurologists and surgeons in civil practice, are some of the following. In the first place, perhaps, one may speak of the surprisingly small size of the wound of entrance which may very easily be overlooked entirely, as there is always extremely trifling hemorrhage from it. This makes the danger that one may consider a transverse wound of the brain, a penetrating one only, a very real one. Second, perhaps, comes the frequency with which one finds that what looks like a simple wound of the scalp is really a tangential wound of the skull, with a furrow channelled out in the bone, and a tear of the dura with more or less injury of the cortex beneath.

The following are good examples of tangential wounds.

Sept. 27, 1915. B.-6-19. Unconscious. Bullet wound in upper left parietal region with wound of exit about 4 cm. posterior to that of entrance. Spastic hemiplegia of right side with increased tendon reflexes, and absent skin reflexes. Ankle clonus on the right and Babinski's sign present on both sides. Pupils equal. Pulse 65. At operation a large horse-shoe shaped flap was turned down, and below the bone was found channelled by the bullet which at the center of its course had lacerated the dura. On removal of the bone, a slight but extensive hemorrhage over the cortex beneath the dura was seen. Drainage, and flap replaced. On Oct. 1, it was noted that for 48 hours the patient had been very dull, but the spasticity had diminished. Left pupil larger than right. Well-marked paralysis of right side of face, and right arm and leg, with Babinski's sign, on that side alone, with no Oppenheim's reflex and no ankle clonus.

Oct. 2. Temperature normal. Feeds himself. Pupils equal. Does not speak.

Oct. 3. Slight optic neuritis. Recognizes objects. Does not speak. Sometimes nods "yes" at incorrect name of objects shown, but never "no" to correct name. No apraxia. Probably sensory loss on right side. No voluntary motion of right extremities.

Oct. 4. Same condition. Evacuated to England.

This case was somewhat similar but was notable because of the lack of initial loss of consciousness.

Sept. 29, 1915. B.-2-21. Tangential shrapnel bullet wound in right parietal region. Was not unconscious. Noticed at once that the left arm was paralyzed, calling to a companion, "My arm is gone." Ran back a distance of over a mile to ambulance station. Pupils and external ocular muscles normal. No paresis of tongue or jaw. Slight paresis of left face, more marked in muscles about the mouth. Nearly complete paralysis of movements of left hand

and fingers, while those of shoulder, upper arm, and supinators and pronators of forearm are only slightly weak. Leg shows good strength, though very slightly less than the right leg. No Babinski sign, ankle clonus, or increase of tendon reflexes in leg. At operation, after turning down a large skin flap, the bone was found channelled, with some splintering of the inner table of the skull, laceration of the dura, and slight cortical hemorrhage beneath the dura. Drainage.

Oct. 4. No fever. Face shows less paresis. No increase of power in arm.

Oct. 5. Left hand still very weak. Well-marked astereognosis in this hand. Sensation for touch and pain slightly diminished in left hand. Sense of position is good.

Another case showing very superficial cerebral injury, and also one where the localization of the missile was determined very exactly by the X-ray picture, was the following.

Sept. 29, 1915. B.-5-3. The patient showed a single shrapnel bullet wound in the right occipital region, with no wound of exit. On entrance the soldier was conscious and rational. Pupils and ocular muscles normal. There was no paralysis of the face, tongue or extremities, and no evidence of injury of any cranial nerve. The reflexes and sensation showed no abnormality. The only sign found on examination was a very distinct right lateral homonymous hemianopsia. The X-ray showed the bullet apparently embedded in the occipital bone. At operation it was found just below the wound of entrance embedded in the bone, but with a fairly extensive depressed fracture, and considerable splintering of the inner table of the skull. The bullet together with the fragment of bone was removed. The dura again had been lacerated and there was a slight but fairly extensive hemorrhage beneath this over the surface of the occipital bone. Drainage.

Oct. 1. No headache. No fever.

Oct. 3. Fundi normal, and at no time has there been any swelling of the optic discs or evidence of optic neuritis. The hemianopsia has diminished in extent, but still persists, on discharge to England.

This last case illustrates well the condition found with penetrating wounds of the brain.

Sept. 27, 1915. B.-5-1. Penetrating bullet wound from side to side in upper part of skull, the track of the missile being nearly in the frontal plane, and a little anterior to the middle point, antero-posteriorly. Unconscious. On examination there was found only slight spasticity, about equal on the two sides, of both legs, and to a less degree still of both arms. Tendon reflexes all increased and about alike on the two sides. The man died about thirty-six hours after entrance, with no change in his condition, and autopsy showed the wide destruction of the brain in the track of the bullet, varying from 2.0 cm. to 3.5 cm. in diameter, larger towards the wound of exit, the track of disintegrated brain extending from the right 2d frontal convolution near its posterior end to the lower part of the left 1st frontal convolution, just in front of the anterior central convolution, and above the anterior horn of the ventricle on the left,

but traversing the right ventricle. The hemorrhage on the surface of the brain was very moderate.

Experience with the wounds of the brain shows that early operation offers no advantages to compensate for the disadvantages of limited appliances at the hospitals near the firing line, and the absence of exact localization of the missile, by careful examination aided by X-ray examinations, and early measures are best limited simply to those necessary for control of hemorrhage, and the application of protective dressings. Later, at a base hospital where proper examinations have been made for determining, as far as can be done, the amount of damage done to the brain and the position of the missile if still present in the head, further measures can be taken. In most cases attempts to extract the missile do more harm than good, though where it can be accurately located by stereoscopic X-ray plates, and seems easily accessible, it may be removed by the use of forceps, or by a powerful magnet. All of these wounds of the head, however, should be explored. The most satisfactory results have been obtained by using the following method. A large horse-shoe flap of the scalp is turned down, in order to expose a good portion of the bone surrounding the wound of the skull, and to enable one to determine exactly the amount of damage done to the bone. All broken and loose fragments of bone should be removed, especially fragments of the inner table lying loose upon the dura, and generally the bone defect produced by the bullet should be considerably enlarged, to expose the dura beneath. Experience has shown the desirability of not enlarging the opening in the dura made by the missile. This is chiefly because all bullet wounds are infected wounds, and probing or enlarging the opening in the dura breaks the first protective adhesions formed in the lymph spaces of the dura and beneath it, and enormously increases the risks of meningitis. For the same reason, because bullet wounds are always infected wounds, drainage is practically always required. In general this is better done in other ways than through the track of the missile through the scalp. This should be excised and closed and the drainage be maintained through a fresh opening in the scalp, or at the edge of the flap. In many cases, where the injury of the brain is largely superficial, sufficient drainage may be maintained by rubber tubes, or other forms of drains, passing under the skin flap to the point of injury, or two drains, one to each corner of the semicircular incision, which allows the use of irrigation if this be considered necessary. In penetrating wounds, drainage is maintained better by glass or metal tubes, with many side perforations, passed into the track of the missile. Even then drainage of the destroyed and

disintegrated cerebral tissue has been found to be difficult. Good results have been obtained by filling the drainage tube with sterile glycerine and packing about the tube with gauze soaked in glycerine, which seems to prevent the caking of the exterior of the tube with dried detritus. Good results have also been obtained by using a solution of 5 per cent. salt in 1 to 200 carbolic solution.

Another point which deserves careful study by neurologists and surgeons is the treatment of the traumatic swelling of the brain which immediately follows the receipt of the injury. It may be that immediate treatment, with the control of this edema in view, should be carried out at the first field hospitals, or as early as possible after the receipt of injury. It has been found that very frequently this can be controlled perfectly readily, and a hernia of the brain prevented, by repeated lumbar punctures, a procedure that can easily be done at places where there is no time or appliances available for operative interference such as opening of the skull. Occasionally, a decompression operation upon the opposite side of the head to that of the injury may be required.

Functional nervous troubles are fairly common among the soldiers at a base hospital, and quite a number came under my observation while at the hospital in France and at some of the hospitals in England which I visited. Curiously enough these functional cases seem to develop very rarely in those who have been wounded. However, this statement must be made with some reserve, for we are hardly in a position to make statements about what forms of functional nervous disturbance may be found as late sequelae of wounds. Certainly the functional cases seen at a hospital near the front were almost invariably in those who had not been wounded and were seen most frequently in those who had suffered some sudden shock, such as those who had been thrown down by the bursting of shells of large caliber, or buried in the dirt when a trench had been blown in by the explosion of such shells. Hysterical paraplegia is not uncommon in such cases, or hysterical hemiplegia. These can be differentiated from the cases of obscure injury of the spinal cord, or brain, as those caused by concussion, without much trouble as a rule by the usual methods, the physical signs showing something incongruous or incompatible with an organic injury, such as the absence of disturbance of the reflexes, the absence of anesthesia, or its failure to correspond with what would be produced by a lesion which could cause the paralysis found, or most frequently in the cases simulating a lesion of the cord, by the lack of disturbance of control of the bladder.

Hysterical amblyopia is observed fairly commonly also, and hys-

terical aphasia. One case of this sort seen by me was the following.

Sept. 26, C.-7-37. This man had no wound. He showed a total aphasia, inability to read, and agraphia. Yet there was no mind blindness or apraxia, the man recognizing objects perfectly and indicating their use, and he was able to copy both print and script. Yet alexia was present, as he failed to execute simple written commands. The symptom which seemed most definitely to stamp this case as one of hysterical aphasia was the fact that there was total bilateral deafness for both air and bone conduction, a condition which is practically impossible from cerebral injury, and in this case there was no evidence of injury of the ears, nor of a possible injury of both auditory nerves.

In England I learned that such cases were seen in considerable numbers, and that sudden cures had recently been obtained in a number of them by giving them ether to full surgical anesthesia, the speech and hearing being quite normal on recovery from the anesthetic.

Very frequent, too, are cases which have been called by a variety of names, the favorite one being neurasthenia, or shock, which seems very certainly to be a general functional nervous disturbance. The most frequent type which was seen at our hospital presented a syndrome of symptoms that varied a good deal in individual cases, and yet in general presented certain symptoms pretty consistently. The most frequent symptoms observed were a rapid and easily accelerated pulse, a rather rapid, coarse tremor, which frequently affected the trunk and head as well as the extremities, and marked susceptibility to fatigue. These cases showed no evidence of a cardiac lesion of any sort, either by the presence of fibrillation or extra systoles, nor any distinct arrhythmia or enlargement. In short, the entire physical examination was persistently negative except for the rapid pulse, which was rarely above 140. We never found any enlargement of the thyroid gland, or evidence of increased blood supply to this gland, no exophthalmos, nor much disturbance of the vasomotor system. Occasionally, however, sweating was present in rather a marked degree upon excitement or exercise. Quite often, too, there was found a marked vasomotor skin reaction, with the white line, bounded by two reddened ones, but without much edema, following quickly upon irritation of the skin by stroking briskly with a pointed object. This reaction was generally rather persistent, frequently lasting twenty minutes before fading. This vasomotor reaction, however, was by no means constant, and was missing in fully a third or more of these cases. I may add that in these cases we never found either the physical or mental stigmata of hysteria.

A CASE OF POSTERO-LATERAL SCLEROSIS FOLLOWING STREPTOCOCCUS INFECTION—TRANSMITTED TO RABBIT AS MYELITIS*

BY DR. EDWARD M. WILLIAMS

SIoux CITY, IOWA

A certain number of cases of myelitis have been attributed to cold or congestion, or other unproven sources. Several cases of this obscure type having come under my observation, the conclusion was formed that there must have been something in the nature of a local infection as a cause.

One case in particular, in which I was so positive of syphilis as to give a course of anti-syphilitic treatment despite the patient's protests of impossibility of infection and negative reports on the blood and spinal fluid from two reliable laboratories, was of especial interest. This case has been added as a probable secondary infection of some kind.

The first patient described had the symptoms of a postero-lateral sclerosis with no definite or evident cause. Finding six old roots in the anterior lower jaw, these were removed and a culture made by Dr. C. Maxwell—a hemolytic streptococcus was found which injected into a rabbit gave a posterior paraplegia with incontinence of urine and feces fourteen days after the inoculation. Further culture from the cord did not show anything as the rabbit was probably killed too soon after the occurrence of the paralysis (third day). The cord showed an area of myelitis and softening.

CASE I. Woman, age 40. Patient of Dr. R. Q. Rowse.

Attack of weakness of legs two years previously, cleared up in a few weeks. Two months before my examination she began to get weak and uncertain in the movements of her legs. A diagnosis of pernicious anemia was made at the time. The weakness in legs gradually became worse. At the time of the examination she could scarcely walk by assistance of two nurses, gait was spastic ataxic type. Paresthesia, but no objective sensory changes in legs, except some slight impairment of sense of touch and position. Legs extremely ataxic and spastic. Babinski positive on left, doubtful on the right—clonus of both ankles and increased knee jerks. The blood examination gave negative Wassermann and slight degree of

* Read by title at the forty-second annual meeting of the American Neurological Association, May 8, 9, and 10, 1916.

anemia, no indication of pernicious type. Optic, auditory and other cranial nerves normal. Cultures were taken from teeth removed as mentioned above. Case later developed incontinence of urine and feces, has been about the same in regard to the paraplegia.

CASE II. Age 30. Patient of Dr. R. Q. Rowse.

Operated for appendicitis—thickened adherent appendix—several weeks before examination. Improved, then a week before examination became worse, legs weak, etc., as follows:

When first observed the patient would walk across the room, but only with difficulty, said his legs felt "too loose and too stiff both," also said they felt numb and dead. Had involuntary defecation. Mentioned having had short periods in which he could not say what he wanted to say during last few weeks. During my examination he had such a period lasting about five minutes in which to every question he would answer, "Dowinks dannn it dowinks." When he recovered from the aphasic attacks he could remember my questions and said he understood them, but could not get the right words, claimed he never used the word "dowinks" before.

Examination.—Pupils dilated and equal. Reacted well to accommodation, but light reaction doubtful. Discs were poorly outlined and hazy. Saw double in looking toward the right in distance, average distance vision normal. Prolonged expiratory murmur in right apex. Blood pressure 95-55. Reduction of sensation to pin prick and touch up to nipple line—not positive however. Abdominal, cremasteric and plantar reflexes absent, no clonus. X-ray negative. Two days later the patient was unable to move the legs at all, some numbness in ulnar distribution of left arm. Reflexes of both legs very much exaggerated, both knee jerks and ankle jerks. Spasmodic type of bladder incontinence occurring periodically. Previous examination showed greater haziness of discs, left showing more prominence. An irregular temperature not any higher than 100 in the evenings was present. The case remained at a standstill for several weeks, during which active anti-syphilitic treatment was given. The lumbar puncture showed some pressure, the fluid was clear, slight increase of lymphocytes—no tubercle bacilli, no fibrin clot and negative Wassermann. Left hospital in several weeks unimproved.

REPORT OF THREE CASES OF FAMILIAL SPASTIC PARALYSIS*

BY C. EUGENE RIGGS, M.D.

ST. PAUL, MINN.

Family history negative, except male on father's side had epilepsy. Neither parent alcoholic or luetic. Grandparents died past 60; one of tuberculosis. Mother's father alive and well. Mother's mother had ten children; all well. Father's mother had seven children. One brother has two children, all well; another brother had one child, well; another had one child, died at birth; another brother and sisters are single. Mother's aunts (3) died in infancy. Onr died at 15 of hemophilia.

First Child: E., female, aged 12 years; birth normal. Absolutely well until 3½ years, when she developed whooping cough, which continued until onset of present trouble. April 25, 1906, E. developed an acute illness of two weeks' duration, characterized by fever, intestinal disturbance and delirium, from which she made a slow convalescence. Mother states that a day previous to the onset of this disease, the patient ate a poisoned flower. From this time, walking seemed a little awkward. September, 1906, there was a decidedly spastic gait. Both arms became affected in January, 1907. August, 1907, speech became affected, because jaws seemed to be stiff. General condition grew worse for two years, then became stationary. In 1910, it was first discovered that the child was blind. E. has not spoken a word since 1910 and can only give a whining cry. Cannot chew food, because of rigidity of masseter muscles and has to take liquids. Some difficulty in starting flow of urine. For the past four years, E. has suffered from occasional epileptiform attacks, when the eyes turn to the left, and mouth draws to left, and the whole body stiffens out. Frequently, it is only a shivery spell. Has been drooling from the mouth for the past few years. At present, there is general atrophy of all the muscles of both lower extremities, with spasticity and marked contractures. Same atrophy in the upper extremities, neck muscles, jaw and both recti abdominal muscles and spinal muscles, with marked spasticity. Babinski on right side; questionable on left. Oppenheim and Gordon present on both sides. Deep reflexes increased; superficial reflexes normal; no sensory disturbances. Blood and urine normal. Wassermann in blood negative. Spinal fluid pressure normal; no globulin; 4 lymphocytes; Wassermann negative; colloidal gold curve normal.

Second Child: H., male, 9 years old and well.

Third Child: I., male, 7 years old and well.

* Read at the forty-second annual meeting of the American Neurological Association, May 8, 9 and 10, 1916.

Fourth Child: K., female, 5 years old. Birth and development normal. Perfectly well until March 10, 1914; except that K. had occasional headaches during the past winter and was restless in her sleep. During last week in February, 1914, K. had a mild attack



FIG. 1. Child E before illness developed.

of chicken-pox, from which she entirely recovered. About March 10, 1914, she began to walk aimlessly, as if she could not see well. Eyesight gradually grew worse. Mother thinks that she can see only with left half of eyes, for she stumbles against things with her

right side and holds her head towards right. Head slightly retracted. Has some difficulty in walking and in climbing on bed. Her left arm is slightly affected; uses it awkwardly. Her left leg is spastic. Back muscles rigid. Drools from left side of mouth.



FIG. 2. Child E when seen by writer.

Cranial nerves normal except mild paresis of left seventh. Background of eyes normal. Bilateral Babinski; no ankle clonus; bilateral increased knee jerks; no sensory disturbances; Wassermann

in blood negative. Spinal fluid pressure increased; no globulin excess; no lymphocytosis; Wassermann negative; colloidal gold curve normal.

Fifth Child: M., boy, 4 years next May. Well except an attack of eczema when three months old, lasting one year, from which he gradually recovered.

Sixth Child: O., girl, 2 years old next May. Birth and development normal. Began walking at sixteenth month. About first week in December (1913) (when patient was 20 months old) left leg commenced turning out, patient walked stiff, left knee would bend backward; finally whole leg became awkward. About 2½ months later, right knee commenced bending in, and child had a tendency to fall backward; became frightened and would not walk any more. In the early part of March, would still stand up at a chair, but has not attempted this for the past three weeks. Now is unable to sit up alone. A short time after, right leg became involved; left arm became affected and spastic, with contractures of the flexor muscles of the hand. During the past week, fingers of right hand are also commencing to show the same tendency. Child is restless and cries frequently during the night.

All examinations negative except spasticity of lower extremities. Wassermann in blood negative. Spinal fluid not examined. Temperature and pulse of all patients normal. Wassermann in blood of mother negative.

Spastic paralysis with increased reflexes and no sensory disturbances was described by Charcot under the name of spastic tabes and by Erb under that of spastic spinal paralysis. The cases of Minowski, Lapinski and Dreschfeld made it impossible to longer accept the theory that this symptom complex could be accounted for by a pyramidal tract degeneration. Dr. Osler, in 1889, in a letter to Dr. Gee, said: "Curiously enough, I saw last week, with Dr. Latimer, a spastic paraplegia case in a child whose brother is said to be affected in the same way. I do not remember in my somewhat extended review of the literature to have seen reference to such cases." Notable among those first to emphasize the hereditary element in these cases were Seelig Miller, Schultze and Bernhardt. Fruid refers to this type as Hereditary Familial Infantile Cerebral Palsy. The cases of Gee, Newmark and others clearly indicate the familial character of the disease, also that it is due to a congenital tendency. The disease may occur in infancy, childhood or adult life. Strümpell has reported cases occurring between the twentieth and thirtieth years. Moletti described a case which began as late as the fortieth year. Usually all the children in the family do not become affected; rarely, it is transmitted from father to son, as in Gee's case. In the family under consideration, which was composed of three boys and three girls, the latter were alone affected.

The classical syndrome of this disease is spastic paralysis of the lower extremities, often involving the trunk muscles, occasionally the upper extremities and sometimes the face muscles as well. The muscles of the upper and lower extremities, as in our cases, are hard and resist passive movements. Reflexes are increased; ankle clonus and Babinski are commonly present. Pes equinus and adductor contractions occur. Some patients soon become bedridden, while others may walk for some time. Optic atrophy may occur; as may also weakness of the eye muscles, nystagmus, vertigo, idiocy, speech defects, bulbar symptoms, atrophy of the small muscles of the hand, bodily defects, kyphosis and scoliosis. Sensation is normal and there are usually no involuntaries. The familial characteristics are clearly evident in these patients, although no definite fault could be discovered in the racial line of either parent. Physical peculiarities have, however, been observed in individuals, some of whose relatives were affected with familial nervous disease. Loss of knee jerks has been observed by Bernhardt in a member of a family in which there occurred several cases of progressive spinal atrophy complicated with bulbar palsy. Bloch has reported lost knee jerks in otherwise healthy members of a family, in which there occurred three cases of spastic paraplegia besides other nervous diseases. Newmark has called attention to the existence of increased tendon reflexes in spastic paraplegia.

INTENTIONAL HYPERTONIA*

A CONTRIBUTION TO THE CORTICAL LOCALIZATION OF MUSCULAR TONUS

BY SIDNEY I. SCHWAB, M.D.

ST. LOUIS, MO.

This paper is an attempt to outline a theory of muscle tonus which may be of clinical utility and to offer in support and proof of this theory a clinical syndrome to which the name "Intentional Hypertonia" has been given. If there is any novelty in this paper it lies in the effort to support the idea clinically that there is a cortical localization of tonus and to relate such a localization to effort, will, emotion, and intention, and to connect up such notions with the actual condition as seen in a rare type of pseudo-spastic paralysis.

A great literature has sprung up around the question of muscle tonus, much of which appears to be of little value in the consideration of the question proposed by this paper.

A conventional definition of tonus is as follows:

Each muscle in the body is in a condition of slightly continued contraction which keeps it tense. This tone may be abolished by cutting the anterior or posterior nerve roots, by shock, anesthesia, or disease.

A definition of tonus is of less interest than its mechanism, its localization, and its relation to the conception of reflex. To term tonus a reflex, the so-called muscle tonus reflex, appeared for a time to have satisfied the most necessary physiological requirements. A brief sketch of the progress of the knowledge in respect to muscle tonus is of some interest, chiefly because it shows how deeply concerned the physiologists have always been on this subject, and through what a confused maze of conflicting theories the present conception has had to go.

Claude Bernard believed the skin sensibility was not without its influence on muscle tonus. This idea was quickly disproven by experiments on the skinned frog.

Donders-Brondgest showed that tonus was not only a spinal cord

*Read at the forty-second annual meeting of the American Neurological Association, May 8, 9, and 10, 1916.

function; that is, as far as the frog was concerned, but was independent of the motor activity. By cutting the posterior root in the frog they were able to produce complete flaccidity of the leg on that side. This experiment, by the way, gives a certain amount of physiological support to Förster's posterior root section operation for the relief of spasticity.

These early notions of tonus as a spinal reflex function began to be questioned chiefly through the studies of Sherrington and others, and the numerous observations which were made on the functions of the cerebellum are an important factor in the consideration of tonus. The idea of a cerebellar influence on tonus was proven both experimentally and by studies on cases of cerebellar lesions with complete hypotonia of the skeletal muscles. A consideration of the part played by tonus in the production of tabetic ataxia suggests the steadily increasing importance of the tonus question.

In 1906 a fresh viewpoint is advanced, chiefly through the work of Sherrington and his students. This series of papers dates from 1906 up to the most recent one on muscle tonus by Langelain in 1915. It is to the development of the tonus theory in this interval, namely as I have said due to the work of Sherrington, that I now desire to call your attention. Tonus in Sherrington's sense is nothing more or less than that form of muscle function in which it acts as an excitant of posture.

It is of course impossible in a few words to outline satisfactorily the relation between the conception of the proprioceptive system in its reflex aspect to the question of tonus. Sherrington considers the nervous system as largely a mechanism of reflexes, the initial stage of which takes place with the starting of centripetal impulse, which in due course excites the reaction. The term "receptor" is given to the mechanism which lies at the periphery. There are logically two sets of such receptors; a surface field constituted by the surface layer of the organism, and the deep field, constituted by the tissues of the organism beneath the surface sheet. There is then an interoceptor and an exteroceptor field.

Laying aside the question of the peculiar activities of the extero-field as only of indirect interest to the question of tonus, the interoceptive field demands more consideration. The receptors which lie in the deep tissues appear adapted for excitation by changes going forward in the organism itself. These changes work largely through the activity of mass in its mechanical consequences of weight and inertia, and also largely through the mechanical strain of pressure resulting from contracture and relaxation of muscles. Therefore, a

characteristic of the stimulation occurring in this deep field is that the stimuli are traceable to activities of the organism in itself. So this may be termed, therefore, proprio-ceptors and thus the proprioceptive system comes into theoretical existence.

There are three characteristics of this proprioceptive system:

First. Its primary reaction to its own organism, and its secondary reaction to environmental stimulation.

Second. Its evocation of compensatory reflexes.

Third (and most important to the question here considered). The tendency to induce a motor tonus reaction in the skeletal musculature.

Now comes up the question as to the purpose and use of tonus of the skeletal muscles. Sherrington discarded the theory that muscle tonus serves the so-called muscular sense through a constant series of tension impulses to joint surface, tendons, and muscles, and makes the suggestion that reflex tonus is an expression of neural discharge concerned largely with maintaining attitude. Attitude, of course, is the sum of the segmental postures as total movement; as is locomotion the sum of segmental movements. From this conception it is but a step to the consideration of a necessary mechanism which is associated both to total movement and total position. Such a mechanism is met with in labyrinth, and in this sense the labyrinth must be considered a proprioceptive organ. The association of cerebellum with the labyrinth is so close that it is necessary to fit the cerebellum in with the proprioceptive scheme, and Sherrington concludes this paper, published in 1906, with a statement that the cerebellum may be described as the head ganglion of the proprioceptive system. It appears, therefore, a fair conclusion that tonus mechanism has been forced by virtue of the upright position assumed by man and the lower mammals to find its localization in a more advantageous position to the organism as a whole and away from the peripheral system of organs, such as, skin, peripheral nerve, spinal cord. Such a favorable position is to be found in the cerebellum, because of the necessary function associated with upright position and locomotion. The influence of the cerebellum either in maintenance or in the control of tonus must be admitted.

With the assumption of the upright position and the necessity of upright locomotion the maintenance of the proper tonetic relation between the flexion and extension of the skeletal muscle groups becomes increasingly more important.

I have not time in this brief résumé to go into the questions of the arguments which have been advanced in support of the rôle of the cerebellum in regard to tonus.

The next step is to point out the logical necessity for linking the cerebellar function of tonus to that of the cortex through the basal ganglia, especially the lenticular nucleus and the extra-pyramidal system.

The work of Charles K. Mills is especially to be noted in this respect. Two papers are important; one *The Central Mechanism of Emotional Expression* in 1912; the other *Muscle Tonicity and Emotional Expression* in 1914 and 1915. I believe that these two papers of Mills and those of Sherrington and his students, referred to before, are the most significant contributions to the newer conceptions of the tonus question. Mills readily admits that the cerebellum is a tonetic organ, but does not admit tonus is a fundamental cerebellar product, and he finds the anatomical path to the cortex from the cerebellum by way of the cerebello-rubro-spinal apparatus, and is in agreement with the theory of Crocq, that as we ascend from the lower types of animals, frog, dog, ape, to man the tendency of tonus is to become more and more cortically localized.

Mills further regards the tonetic apparatus as being structurally separate from the motor projective system and more specifically places it in the mid-frontal region, regarding this frontal cortex as lying between the anterior pole of the frontal lobe and the central fissure.

The major portion of the mid-frontal cortex is not excitable by the electric current as are the pyramidal motor centers. The non-excitable centers are concerned with the maintenance of tone. If the mid-frontal region has to do with tonicity, cases of disease supporting these views should be forthcoming, according to Mills. The recorded cases are not numerous. There is, however, one mentioned in Mills's paper by Petrina, the original citation of which I was unable to get, which is of some importance as referring more specifically to the clinical cases to be afterwards discussed in this paper. It concerns a case of bilateral tumors almost destroying the frontal lobes with the following symptoms—mental weakness, emotionalism, choreic movements increased by emotion, contractions at the elbow, etc.

A study of the literature on this subject of myotonia, including under that head the atrophic and congenital types, gives further suggestion that many of these cases show the phenomena of hypertonia, the interpretation of which goes to support the contention that there is a cortical tonetic apparatus.

Apart from the literature which arose from and clustered about Wilson's epoch-making paper on bilateral lenticular degeneration, in

all of which the question of tonic innervation is emphasized, there are two significant papers which ought to be mentioned—The Phenomena of Tonic Innervation in Relation to Apraxia, by Wilson and Walsh in 1914, and The Physiological Significance of the Reflex Phenomena in Spastic Paralysis of the Lower Limbs, also by Walsh in 1914. In this paper Walsh proposes to substitute for the term "tonic perseveration" which was devised by Leipman, tonic innervation—meaning that kind of innervation of muscle groups which persists in spite of the patient's endeavor to inhibit it.

In two of the three cases which form the basis of this paper, large endotheliomata were found on operation in the frontal lobes. These observations are important as showing the significant part played by volition or intention on tonic innervation. In the fourth conclusion advanced as a result of the studies in this paper the following is found: The symptom, tonic innervation, was evidently solely and exclusively during voluntary innervation of the muscle group concerned.

I can refer only very briefly to the literature grouped about the subject of apraxia, especially Kleist's efforts to furnish a hypothesis for a tonic coördinating apparatus by an afferent and efferent reflex. Leipman, Lewandowsky and others have written on the subject of apraxia and its relation to muscle tonus.

With this brief literature résumé in mind, which supports the contention of the cortical localization of tonus, I wish to outline in a few words the clinical evidence in support of this notion as seen in cases to which the term intentional hypertonia has been given. The origin of this term I am at present unable to give. For some time I had supposed it was a phrase of my own to describe a phenomenon seen in a series of cases, but in going over some literature on spasticity I am sure I have seen the term, probably in another sense. I have been unable up to the present to ascertain just who first used it and for what particular reason.

By intentional hypertonia I mean this: Muscle groups which in a state of flaccidity or semi-flaccidity show to palpation no spasm or contracture whatever, when they become the subject of intended movement associated with emotion or desire show incontestable evidence of hypertonia, just as hypertonic muscles are seen as the result of resistance movements. There is, therefore, overaction, adductor attitudes, flexor overaction at the elbows, and all the phenomena which accompany innervation, both as to gait, attitude, facial expression, etc. This condition of intentional hypertonia is unaccompanied by any evidence, as far as the reflex or the existence

of plantar extension is concerned, of involvement of the pyramidal tract except in one case. When the patient is at rest or when volition, intention, or emotion are not in force the patient's arms and legs are flaccid, hypotonic, and relaxed.

I have had the opportunity of observing and studying five cases in which intentional hypertonia, as described above, has been observed, and I shall merely in this place attempt to give a kind of composite clinical picture, reserving for a later time a more detailed clinical description. The cases were all children; the youngest being nine months of age, the eldest eleven years. Of the five cases four showed some degree of mental deficiency.

The following note of Case 1 describes fairly accurately the hypertonic movement:

When patient is lying down in bed there is a constant tremor-like movement of fingers and wrists; movement is slow and co-ordinated; is rather similar to that seen in Parkinson's disease. Movements consist of a slow flexion and extension of fingers; adduction and abduction of the thumb, and alternating flexion and extension at the wrist, with an occasional pronated and supinated movement thrown in. Upon the slightest emotional impulse or attempt at volitional movement the rapidity and variety of these movements increase enormously, so that they take on a hypertonic, suggesting spastic muscle movements. They therefore may be described as intended hypertonic movements. The same condition applied to the legs: Flaccid at rest, they become spastic and hypertonic when the patient attempts to move the legs in walking. He is unable to walk, but the thighs are adducted, legs crossed, flexed at knee and are shown in a condition of rapid spasmodic hypertonic movements similar in type to those seen in cases of spastic paralysis of the legs. Intelligence of child distinctly below normal; he is passive and uninterested, responding only imperfectly to efforts to attract his attention.

For Case 2, a child of eleven years of age, the note is as follows:

Constant athetoid movements of hands, arms, head, toes, and feet, particularly on emotional reaction. Arms spastic and marked decrease in muscular power. Legs show some adductor spasm, which is very much increased on intended motions. Reflexes present and equal. Babinski with marked spreading of toes being present. Same weakness referred to above in arms present in legs. Gait is an adduction gait from wide fixed support at feet. Progression thus maintained in spite of close approximation of knees. In addition to athetoid movements there are choreiform movements, jerking of

head, shoulders, and hands, independent of volitional efforts at motion. Mentality of child appears to be normal.

For Case 3, a child of three years of age, the following is a note of interest:

In marked movements, whether attempting to walk or any other purposive movement, there is a marked increase of tonicity. In attempting to walk there takes place suddenly a marked abductor spasm with spasmodic shortening of the Achilles tendon, and overaction of the abductors of the toes. In lying down and at rest and when there is an absence of volition or emotional reaction, there is no evidence of hypertonicity; but even in passive movements there takes place instantly a condition of hypertonicity.

In the other two cases a similar condition was noted.

This condition of intentional hypertonia is herewith described in order to call attention to a symptom which may perhaps characterize a certain type of pseudo-spasticity seen in children, and likewise suggesting further investigation into the cortical localization of the tonus and its influence of volition in motion and intention.

A QUESTION OF EPILEPTIC DEMENTIA WITH RECOVERY

BY D. A. THOM, M.D.,

PALMER, MASS.

Summary of Case.—Male, aged 37 years. Admitted to Taunton State Hospital, April 20, 1906. Transferred to Monson State Hospital, May 3, 1906.

Family History.—Negative.

Previous History.—Patient was born in Portsmouth, R. I., thirty-seven years ago. He has always been sensitive, easily offended, quick tempered and seclusively inclined. Attended school until sixteen years of age, advanced as far in studies as second year in high school; was quick to learn and retained his knowledge well. Was employed as private secretary by the Old Colony Brewing Company, received good wages and was well liked by employer. He never used liquor in any form; smoked moderately.

Medical History.—During teething period patient had one convulsion. Had whooping cough at six years of age, scarlet fever and measles at seven, and diphtheria four years later; no convulsions associated with any of these illnesses.

When about twenty years of age he had what appeared to be at that time a petit mal attack; he lost consciousness and fell, hitting his head against a door, sustaining a slight injury. During the next two years the attacks became more frequent, but were usually of the petit mal type. At the beginning of the third year the character of the convulsions changed—instead of the daily petit mal seizures he would have two or three grand mal convulsions, when he would become markedly cyanosed, froth at the mouth and go through the typical convulsive movements of the epileptic. The frequency and severity of the attacks were such that the patient was mentally confused most of the time; speech became slow, and retarded, orientation imperfect. He had shown no violence up to the time of his admission, but had fixed ideas concerning members of his family—thought they were working against him. Such was the history when he was committed to Taunton. From the following history it will be noted that he was somewhat improved mentally when received at Monson.

Hospital History.—Admitted to Monson State Hospital May 3, 1906.

Physical Examination.—Negative, with exception of smallness of ears, constipation, and a typical bromide rash, which covered the face, chest, back and inner aspect of both upper and lower extremities.

Neurological examination revealed nothing abnormal.

Admission Note.—Patient was depressed most of the time at first; consciousness was clouded for a day or two previous to a convulsion, and after seizures patient was irritable, lacking in apprehension. He slept poorly and was apt to wander about at night. Memory was very good.

For seven years subsequent to his admission the patient showed a slowly progressing mental deterioration. For the first two years he was employed in the industrial room at work which required a certain amount of planning ability and intelligence. Although he performed his work well he was cross, irritable and opposed to all hospital discipline. At times he was impulsive and violent, making attacks on other patients. He was faultfinding to the extreme. On several occasions it was necessary that he should be placed in seclusion on account of his post-epileptic mania. After four years' residence in the hospital the patient presented the following symptoms of marked dementia: He was doing no work whatsoever, as he was incapacitated for either mental or physical effort, no matter how slight it might be. He was completely disoriented, apprehension and apperception were entirely lacking, clouding of consciousness seemed quite complete, and memory for both recent and remote events was gone. He was untidy in both dress and personal habits, soiled himself and bed frequently, and had to be dressed by attendant; was able to feed himself and would usually discriminate between what was eatable and what was not, but would use his fingers instead of knife and fork. Only occasionally from out of this mental wreckage would emanate periods of violence, which were short and impulsive outbursts. This condition, which simulated so closely a true epileptic dementia of the severest type, lasted for a period of nearly three years. As will be noted by the chart upon which the number of convulsions has been graphically plotted, the patient was having twenty to thirty severe convulsions each month, but until March, 1913, had never had status. On March 12, 1913, patient began to have a series of convulsions which were of unusual severity and did not respond to the usual treatment. This series of convulsions numbered sixty-nine in all, and lasted twenty-five hours. The patient was in complete coma and death seemed to be imminent. His family was notified of his condition, and the last rites of the Church administered. On the evening of March 13, his convulsions ceased, and within a few hours his general condition improved. Ten days later his condition was no longer considered dangerous, and in three weeks he was up and about the ward; he had not had a convulsion since the attack of status, had gained eighteen pounds, and showed marked improvement mentally. He began to apprehend things which were going on about him and his intake was keener; he became tidy in personal habits and it was no longer necessary to aid him in dressing. On April 15, 1913, or exactly thirty-two days after the attack of status, he had one convulsion, after which he was very much excited, quarrelsome and violent, and it was necessary to place him in seclusion. This condition lasted but a

few hours, and on the following day he had entirely cleared up. In May he had a similar attack, and in June he had his last epileptic seizure. Although it is now nearly three years since the patient had his last convulsion and he has shown marked physical and mental improvement, the epileptic personality still persists. He is irritable, impulsive and quarrelsome, and is faultfinding to the extreme. His complaints are uncalled for and unreasonable. Toward the other patients he bears a feeling of superiority, which often results in fistic encounters. Usually he is kindly disposed toward attendants and physicians, but it takes only slight provocation for him to be abusive when physicians do not comply with his requests. He has accused attendants of assault which, upon careful investigation, proved to be without foundation. Stones, scissors and a fork have

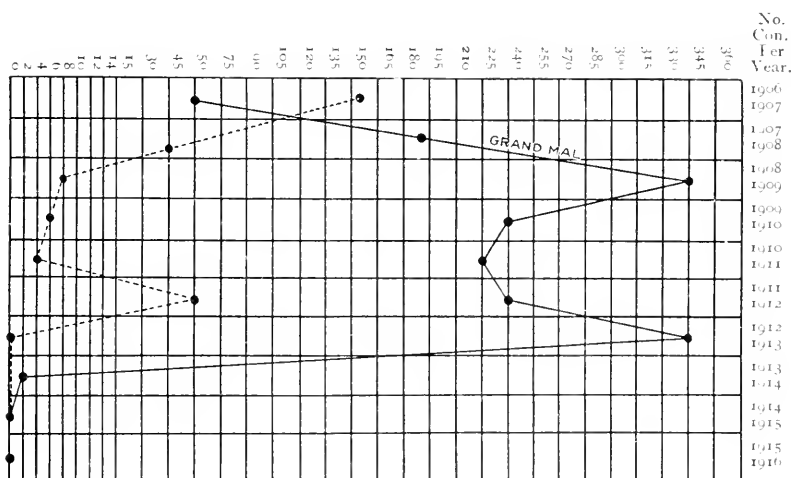


CHART 1. Showing the Number of Convulsions per Year from Admission to Monson State Hospital, May, 1906, Until Cessation of Convulsions, June, 1913.

been found secreted upon his person—these, he stated, he would use at the proper time. When permitted to go to the public entertainments, would create a disturbance by his noisy, boisterous actions, and would decorate himself in a fantastic manner.

He is hyper-religious, spends much time in daily prayer, and could recite numerous prayers of unusual length without a mistake. For some time it was his custom to go to a neighboring field, where he would hold devotional exercises by himself, but with so much fervor that it disturbed those living nearby, so it was found necessary to keep him on the ward to prevent further annoyance to neighbors. He immediately went to bed, where he remained for three weeks—would not talk or eat in the presence of anyone, and later refused to take food at all. He would lie in bed with eyes closed and resist all attempts made to open them. When informed that

tube feeding would be resorted to, he relented. In October, 1915, his parole was restored and he began working out of doors, raking leaves and fixing the gardens for winter. He performed his duties faithfully and intelligently. When it became too cold to stay outside he was given work on the ward, which he did in a most satisfactory manner; as he is an excellent penman, the attendant has him copy the names of the patients for the daily report, and he has memorized, alphabetically, the names of the sixty-eight patients on his ward and the adjoining one. For the past six months he has been getting along better with the other patients and the attendants. He is allowed to go to the dances and picture shows, and behaves like a gentleman. His only fistic encounter happened very recently, and, strange to relate, he did not take the initiative. It is rather too much to hope that he will ever lose his epileptic characteristics for any length of time; they preceded his convulsions by nearly twenty years (with the exception of one in infancy) and will probably remain until the end.

The following is a summary of mental examination which was done February 20, 1916:

Orientation.—Patient is perfectly oriented as to time, place and person—gives day, date, month and year correctly. Names hospital, nature of disease treated here, knows names of all attendants and building in which he resides; knows names of all physicians on staff at present, also those who have left within the past two and one-half years. Knows name of town in which hospital is located, and its geographical relation to other towns is appreciated.

Memory.—Exceptionally keen for all events occurring prior to the onset of convulsions at the age of twenty-three years. He is well informed regarding his family history; is well acquainted with the facts concerning the lives of his father and mother. He has five brothers and four sisters, and is able to give their names and ages correctly. His earliest recollection of personal life began at five years, when he first went to school. His ability to remember the details of his remote past borders on hyperamnesia. For names, dates, location and events in adult life he shows marked degree of retentiveness. Beginning at the onset of his convulsions and terminating soon after their cessation there is a period during which processes of perception were entirely blocked; that is, the sensory stimuli with which he came in contact were inadequate to cross the threshold of consciousness, his intake being completely cut off. This period assimilated a true retrograde amnesia, although being produced under different pathological conditions. Since the remission of the convulsions his memory is unimpaired. His school knowledge is well retained—he answers all questions in history, geography and arithmetic with more than an ordinary degree of intelligence.

Emotional Tone.—On day of examination, emotional tone presented nothing unusual, although by his record it is obvious that he has states of marked depression, also periods of religious fervor which border on exaltation.

Train of Thought.—Inclined to be self-centered, but when drawn

away from the ego he was quite capable of discussing intelligently general subjects, and was well informed regarding current events of the day.

Attitude and Manner.—Toward the examiner he was polite, interested in examination, and coöperated in every possible way. Toward other patients he still retains his feeling of superiority.

Conduct.—He is inclined to be irritable, quarrelsome and fault-finding, but to a lesser degree during the last six months than before. He has daily duties which he performs conscientiously and with a great deal of pride.

Attention.—Attention, concentration and capacity for retention are quite normal.

This case appealed to me as one of unusual interest, inasmuch as the recovery from the mental impairment, which was identical with our grave types of epileptic dementia, was quite complete. There remains no doubt as to the clinical certainty of the epilepsy. The infantile convulsion, the epileptic personality which existed for years previous to the second seizure, assures us of our diagnosis, even in the absence of a hospital history covering a period of ten years.

Although the mental condition in the case just cited was in no way different from a true epileptic dementia, we cannot so regard its pathology without establishing the exact sense in which the term dementia is being used.

Bolton defines dementia: "The mental condition of patients who suffer from a permanent psychic disability due to neuronie degeneration, following insufficient durability." While Turner states that "Dementia is brought about by those factors which cause alterations of permanent character in the structure of the cerebral cortex." Notwithstanding the fact that Turner lays stress upon the permanent character of the cortical changes which underlie dementia, he later describes, under the heading of "Post-paroxysmal Psychosis," a condition of acute dementia following a severe seizure, a series of seizures or status epilepticus, and goes on to say that "The patient assumes the mental attitude which was present before the series of convulsions." He does, however, correlate the two statements to a certain degree when he states that "Repeated attacks of this kind exert, in the course of time, a markedly deteriorating influence upon the general mental state."

Tuke writes as follows regarding dementia:—"We see then in dementia a diminished state of mental power shown either in impaired thought or action, combined or separately, and one or the other of these states may be either transitory or persistent."

Summary.—There seems to be little gained from conjecture. We may assume that there was certainly a lack of neuronie stability,

or the patient would not have had the infantile convulsion, yet we are immediately confronted with the fact that the patient had convulsions almost daily for a period of thirteen years and is still without evidence of gross cortical degeneration.

By accepting Tuke's definition of dementia we can diagnose the case under consideration as epileptic dementia with fair recovery, an unusual condition to be sure.

If Bolton's conception of dementia be the correct one we would not expect a recovery. The fact that there was a recovery would necessarily throw it out of the dementia group. It seems that it is time to settle the question of the permanency of dementia, and, if we are to consider it due to irreparable cortical changes, to refrain from using it in the acute mental confusional states which go on to recovery. That is, separate in a clinical way the functional from the organic. This present case is an excellent example where such a distinction would be of value.

Society Proceedings

AMERICAN NEUROLOGICAL ASSOCIATION

MAY 8, 9 AND 10, 1916

The President, DR. L. F. BARKER, Baltimore, in the Chair

(Continued from page 454)

SUMMARY OF GOLD SOLUTION DIAGNOSTIC WORK IN BRAIN SYPHILIS

By E. E. Southard, M.D.

Variety of findings in fluid from different parts of same nervous system. Findings controlled by histology. Correlations with meningitis and sclerosis. Former hemorrhage possibly an important source of clinical error.

FURTHER CONTRIBUTION TO THE TREATMENT OF SYPHILIS OF THE NERVOUS SYSTEM

By B. Sachs, M.D., I. Strauss, M.D., and D. J. Kaliski, M.D.

The experience of the authors during the past two years has confirmed them in their conviction that chief reliance must be placed upon intravenous salvarsan therapy, combined with mercury. Reasons are given, both pathological and clinical, why this method is preferred to intraspinal therapy. A plea is made for earlier and more intensive intravenous treatment. Discussion of the physiology of the cerebrospinal fluid with reference to the question of the action of salvarsan upon the brain and spinal cord. Influence of lumbar puncture upon the biological reactions of the cerebrospinal fluid. The clinical significance of the changes in the biological reactions. Effect of treatment upon tabs and cerebrospinal lues. What does it accomplish in general paresis?

These two papers were discussed jointly.

Dr. Henry A. Cotton said in regard to Dr. Southard's communication that he agreed with the findings, *i. e.*, that the gold sol reaction is the most delicate test we have for syphilis of the nervous system. The finding of positive reaction of the spinal fluid in arteriosclerosis is interesting. They are making routine examinations of the spinal fluid of all patients admitted and are collecting some interesting data regarding the gold sol reaction in cases of non-syphilitic diseases. It is possible that certain toxic conditions of the nervous system may result in a modified gold sol reaction.

Dr. Cotton did not agree with the conclusion of Dr. Sachs in regard to the treatment of syphilis in the nervous system. He had failed to see any benefit by the intravenous injection of salvarsan in cases of paresis and he thought there have been enough cases presented and enough in the literature to corroborate this statement. He had now under treatment three patients with paresis who were treated at the beginning of their trouble by intravenous

injection alone. No improvement whatever was noticed, in fact the patients demented rather rapidly, and he had not been able to get any results in such cases with the intraspinal method for the simple reason that the length of time which has elapsed since the onset of the disease puts them in the advanced stage now and we know from experience little can be done for such cases.

The great danger in advocating the intravenous injection for paresis, especially in favorable cases, is that while some cases may possibly be benefited at that stage of the disease by intravenous injection alone a true paresis case will not be benefited. Hence valuable time is lost and when finally after a year or two these patients come for intraspinal treatment there is no hope for them. If these patients, however, had been treated by the intraspinal method at the onset of the disease the outcome would probably be entirely different. It seems unfair for those to condemn the intraspinal method who have never used it extensively, for the work of Taylor and Ayer, of Boston, Ogilvie, of New York, and Riggs, of Minnesota, would certainly support the contention that the intraspinal method in early cases is very effective in arresting the disease and prolonging the life of the patient and producing remissions, the percentage of which is far beyond the remissions which occur in patients who have not been treated.

The point made by Dr. Sachs and Dr. Strauss that the intraspinal method is dangerous to the patient is not supported by the work at the Trenton State Hospital, in fact they always consider the intravenous far more dangerous than the intraspinal injection. In a case of paresis fairly well advanced and with a very bad heart the intravenous injection is frequently very dangerous.

He also disagreed with the statement regarding the Wassermann reaction in these cases. They did not stop treating a patient in whom the Wassermann reaction of the spinal fluid and blood was still positive. Although many such cases show marked clinical improvement it has been their experience that if they did not permanently reduce the Wassermann reaction of the blood and spinal fluid the disease process was sure to recur.

In their work at the present time they are combining the intracranial method with the intraspinal as there are undoubtedly some patients who react much better to the intracranial treatment. They have modified it to the extent that after the first operation, at which time the skull is trephined, they do not open the scalp again but make a subdural puncture directly through the scalp, draw off the fluid and inject the serum. The advantage of the intracranial method is that the serum reaches the cortex in its maximum strength, whereas by the intraspinal treatment the serum is much diluted and some is absorbed before it reaches the cortex. It is possible in some cases with adhesions around the base of the brain that the fluid does not reach the cortex.

The results so far obtained by the treatment would certainly indicate that the intraspinal and intracranial methods are far more effective than the intravenous alone and that in early cases much can be done, while the well-advanced cases of paresis do not react to any treatment.

Dr. Joseph Collins said it is extraordinary how different one's convictions are after experience. After six years' use of salvarsan he was convinced that we must not attempt in every instance to render the spinal fluid negative. We are in danger of becoming obsessed with the idea that so-called negative Wassermann of serum and cerebrospinal fluid and the absence of cells in the latter fluid means that the individual has neither syphilis nor the results of syphilis. As a matter of fact many of the cases that he has had under treatment, and particularly during the past two years, have shown best results

clinically by giving greater attention to restorative treatment than to specific treatment, that is, after the specific treatment had been carried to a certain very considerable extent. We know so little of the real significance of pleocytosis, globulin excess and indeed of the Wassermann reaction itself. The more he works with the laboratory tests of syphilis the more he is convinced that they are corroborative rather than diagnostic. In other words, he treats individuals with certain symptoms for the disease syphilis, even though the Wassermann reactions are so-called negative. On the other hand, he tells certain persons, whose only evidence of syphilis is a plus Wassermann in the blood, that he sees no objection to their contracting matrimony.

What he said he hoped may not be construed as depreciation of the value of the Wassermann reaction as a diagnostic aid, nor as a guide of considerable reliance in our therapeutic efforts. He wished, however, on this occasion to protest against what seems to be a widespread general assumption and that is, that if the Wassermann reaction is so-called positive, then that is the end of the matter. The disease is syphilis and while the Wassermann reaction continues positive it should be treated as syphilis. Until some method of standardizing the Wassermann reaction is discovered, and until all Wassermann reactions that are done and reported are done according to the method of titration, there is going to be uncertainty and confusion every time this subject is discussed.

His own experience in regard to the method of administering salvarsan is that, as a rule, the intravenous method is the best, but unquestionably there are certain cases in which the intraspinal method succeeds when the former does not. The time is not yet here to attempt to say the characteristics of this latter group of cases, but as for himself he has made the rule that when a patient does not improve under intravenous injections, that is, either clinically or serologically, he tries the intraspinal method. So far at the Neurological Institute they have not had, in his division, any disagreeable consequences from the latter method of administration.

Dr. C. Eugene Riggs was greatly interested in Dr. Sachs' paper on this subject two years ago, as well as in the present paper. During this time he had closely watched the effects of the intravenous or intensive treatment as compared with the intraspinal method and his experience has not been in harmony with that of Dr. Sachs. They have given over 600 intraspinal injections of salvarsanized serum (Swift & Ellis) with no untoward results, aside from one case of aseptic meningitis, which quickly subsided, the patient making a good recovery.

Dr. I. Strauss said when they first came before the Association two years ago the medical profession of the country was then in raptures over this salvarsanized serum. They pointed out the fact that the salvarsanized serum had a minimum amount of arsenic in it and occasionally arsenic could be found in the spinal fluid when salvarsan was given intravenously. They pointed out the fact that the intravenous salvarsan administration was combined with the intraspinal administration and that the beneficial results were dependent upon that rather than upon the salvarsanized serum. To show the gentlemen that in these two years there has been a change in opinion and that they were not altogether wrong in their stand at that time he called attention to the fact that the very individuals who used the salvarsanized serum have turned to what they call the method of salvarsan plus salvarsanized serum. In other words, finding the salvarsanized serum contained no antibody, they have added an amount of salvarsan which is practically 1 mgm. to their fluid to obtain their results. They have in this method only improved upon the method of Ravaut. Regarding the dangers of this intraspinal method there are two cases in his experience which show this method

is not as harmless as generally portrayed. Unfortunately, he thought medical men are a little careless in reporting the sad results of therapy. There was a patient treated by them intraspinaly. He was a tabetic. After the treatment he left apparently in good condition. Dr. Strauss found him in a Brooklyn Hospital later with all the symptoms of a meningitis. Repeated spinal lumbar puncture was done and showed a marked pleocytosis, but no bacteria. Fortunately he recovered. Recently the second case came under his observation. He was treated at one of the large clinics in New York with mercurial serum. There was retention of urine, and retention after intraspinal treatment is not uncommon. It may last for a few hours or two or three days. Because of the retention he was catheterized and the bladder became infected; he succumbed to a pyelo-nephritis. Furthermore, it is to be remembered that anything introduced into the spinal canal is increased in its toxicity and nobody knows how much it is increased. Dr. Cotton speaks of the use of intracerebral medication. When they spoke of the intravenous medication Dr. Cotton came before them with a list of cases he treated by the salvarsanized serum. Now if the salvarsanized serum gave him such wonderful results in paresis, why adopt the intracerebral method, which is more complicated, and more difficult of performance? There is another objection to intracerebral and intraspinal treatment. You may use that kind of treatment in private practice where the individual is willing to submit to the treatment because he feels that he is getting something for which he is paying, but when we are dealing with a class of cases such as we deal with in a charity hospital you will find it almost impossible to get any patient to submit to the number of treatments advised and Dr. Strauss did not see why he should when by a procedure which is certainly quite a little less dangerous, and a little less uncomfortable, he may receive almost the same result.

Dr. E. E. Southard said possibly Dr. Cotton did not catch the point in connection with the gold sol index. The point he was making did not relate to the practice of all laboratories in excluding fluids containing macroscopic blood. The fluids to which he was calling attention were fluids without macroscopic blood. These fluids yielded an index suggestive of paresis, of which there was no histological confirmation and in many instances no evidence of sclerosis or atrophy. These cases did, however, show on the autopsy table evidences of former hemorrhage. The point he was raising is that former hemorrhage, of which there may be no macroscopic sign in the fluid, may still conceivably have left behind it chemical substances altering the gold sol index.

In respect to Dr. Collins' remarks concerning marriage, he should wonder whether any person with a doubtful Wassermann reaction and the concomitant desire to marry was not really a psychopathic person. He believed that he should counsel lumbar puncture, in fact, he regarded it as a medical crime if a case having a positive Wassermann reaction and positive mental symptoms did not receive a lumbar puncture. In order to guard his reputation for sobriety in future, he would say that he did not regard the desire for marriage as necessarily psychopathic.

As to the differential results of the treatment of paresis and brain syphilis they were reporting cases, but he must concede that they are unable for the present to make a convincing differential diagnosis between general paresis and brain syphilis. The method that they have used has been the intravenous injection of salvarsan. They have regarded it as almost a luxury of woe to execute a variety of other more complicated methods when their results with the simple intravenous method were so promising.

Dr. B. Sachs said in reference to Dr. Southard, he thought he was in general agreement with him, although he did not think every candidate for

marriage should be penalized by a lumbar puncture. In order not to be misunderstood he would say that in all of their work they had endeavored to obtain negative reactions as regards the cerebrospinal fluid. In regard to the Wassermann reaction of the blood they allowed that one condition to persist without insisting that the antisyphilitic treatment must be continued to the extreme until a change in the Wassermann reaction of the blood is effected. They found a number of cases which in spite of the most intensive and persistent treatment, for one reason or another, cannot possibly be altered. With regard to the effect in general paresis he could also in part agree with Dr. Southard. In fact, this has been the only point of disagreement with his associates and himself that he had not been able to get them to the point of view that they should regard all general paresis as cerebral lues. He disagreed with Dr. Southard that they would do well to acknowledge all clinically recognized cases as general paresis. They are to be distinguished from the cases of cerebral lues.

The great furor that has been made about the acceptance of the intraspinous form of therapy has come very largely from the dermatological and the purely biological side and here he was delighted to think that in this assemblage of neurologists and psychiatrists they were not quite as mad; they had a right to speak authoritatively on this subject, that the general practitioner should not be made to feel that this is the one reliable form of antisyphilitic treatment. The attention of the general practitioner should be directed to the far greater dangers of intraspinous as compared to intravenous, and the fact that it accomplishes nothing that cannot be accomplished by the far safer intravenous method.

INJURIES TO THE SPINAL CORD PRODUCED BY MODERN WARFARE

By Joseph Collins, M.D., and C. Burns Craig, M.D.

Wounds of the nervous system occurring in war are similar to those incident to civil life. The difference is quantitative not qualitative.

Organic injuries to the nervous system may be grouped under (1) concussion, (2) contusion or laceration, and (3) compression.

Laceration of the spinal cord causes paraplegia, quadriplegia or cauda equina symptoms. The patients develop cystitis, pyelonephritis and general sepsis with fatal termination within nine months. If one excepts the amaurotic, the paraplegic cases are the most dejected group of wounded. Their presence has a very depressing effect upon less seriously wounded. They are a serious problem in a military hospital where beds are in demand for those who can be benefited. The expedient of putting them all in one ward was tried at the American Ambulance. This facilitated nursing, but served to increase their depression. Incurable from the outset they dragged out the most miserable existence possible for human beings. In the meantime, their agony was beyond description. Those wounded low down in the spinal cord invariably developed pains in the lower extremities and bladder, which seldom left them, lancinating in type and comparable to the most severe pains of tabes. Incontinence of bladder and bowels always existed and despite the greatest care multiple bedsores developed. As catheterization was always necessary in these cases, cystitis invariably developed, and when the infection extended to the kidneys it marked the beginning of the end.

Concussion of the spinal cord presents a brighter picture. Concussion with hematomyelia, causing paraplegia or quadriplegia, may follow the impinging of a bullet or shell fragment upon the vertebra without producing

fracture of the latter. Such cases present all grades of sensory and flaccid motor paralysis and usually recover entirely. The degree and the rapidity of recovery are in some instances amazing.

From the study of thirty cases of shell and bullet wounds of the spinal cord the following conclusions may be drawn:

Diagnosis.—(1) The initial physical signs of contusion and concussion of the spinal cord may be identical, but an interval of twenty-four hours is usually sufficient to differentiate the two conditions. (2) Concussion is usually characterized by more profound motor than sensory paralysis. (3) Contusion causes a parallel degree of sensory and motor paralysis. (4) Contusion is attended by numbness and tingling in the extremities affected. (5) Contusion of the caudal segments of the spinal cord involving the cauda equina is associated with lancinating tabetic-like pains in the lower extremities. (6) A stereoscopic Roentgenographic examination of the spine is highly important. (7) Localization. When the lesion included the cord and spinal roots, the symptoms were referable to the segment of the cord which gave off the highest spinal root involved. The anatomical lesion was therefore several segments below the physiological one. When the cord only was involved, the anatomical and physiological lesions were identically situated.

Prognosis.—(1) Concussion with hematomyelia frequently results from the missile striking against the vertebra. Paralysis caused by this condition usually disappears rapidly and entirely. (2) Contusion or laceration of the spinal cord by actual contact with the missile does not usually disappear and is eventually fatal. Decubitus cystitis, pyelo-nephritis and sepsis is the usual course of the disease. (3) Contusion of the cervical region of the spinal cord seldom permits the patient to survive long enough to reach the base hospital.

Dr. John Jenks Thomas, Boston, read a paper entitled, Types of Neurological Cases Seen at a Base Hospital.

THE RISING TIDE OF DISABILITIES FOLLOWING TRAUMA AND THEIR RELATION TO OUR COMPENSATION LAWS

By B. Sachs, M.D.

A general discussion of some of the disabilities following trauma and the increase in number since compensation laws have gone into effect. The special purpose of presenting the subject is to secure harmonious action on the part of neurologists regarding disability claims, particularly with reference to so-called psychic shock, traumatic hysteria and the effect of cerebral and spinal concussion.

Dr. Foster Kennedy said it is impossible for one who has seen some of the neuroses following grave shock and injury occurring in war not to contrast the progress of neuroses following accident or individual disaster insusceptible of compensation with the course of frequently minor accidents, the results of which are complained of over a period of years and not unusually for life. It is not very infrequent for all of us to see patients complaining of rather indefinite symptoms of dizziness, headache, particularly on beginning work, pain, etc., sequelæ of some more or less minor injury two or three years previously, the question of compensation for which has not been settled. Soldiers who have suffered bombardment and most appalling shock are often brought into hospitals in a state of acute mental and nervous distress. Under very simple treatment, care and rest they are able in the vast majority of cases to return to duty in a matter of weeks or months. Their symptoms do not remain permanent as they are more than apt to do in civil life. Five months

after the Messina earthquake no cases of traumatic neuroses were found in the district in spite of the fact that the disaster occurred among a people thought to be highly unstable. These considerations are of the very greatest importance and ought to receive grave attention from this Association.

Dr. James J. Putnam said in former years he took great interest in these cases and had written more or less about them. He agreed with the previous speakers. He thought considerable responsibility rests with this Association to do something in the line of preventive neurology as Dr. Dana has suggested. The persons who fall into these conditions are more or less predisposed and we should do everything we can to bring about a sort of preventive education.

Dr. Smith Ely Jelliffe was in thorough sympathy with Dr. Sachs' remarks relative to the large amount of material that is being thrust upon us by reason of the compensation laws. He would like to feel that we could get a great deal of light cast upon the subject of malingering and particularly of exaggeration if to the ordinary neurological examinations we should add tests upon the autonomic and sympathetic nervous systems. There have been a number of tests devised during the past few years. They give a very definite insight into the reactive types from the vegetative side of these individuals and enable the investigator to get a much better line on malingering and upon exaggeration. They are very definite tests for definite conditions and are as useful as the knee jerks, Babinski's sign or Argyll-Robertson pupils for orthodox organic neurology.

Dr. Charles L. Dana felt in sympathy with Dr. Sachs' presentation and he thought it would be a great satisfaction if we as neurologists held somewhat the attitude, which, as Dr. Sachs suggests, is one of sympathy with the attempt to find organic conditions. This Association ought also to keep in mind the fact that before many years the whole situation will be changed by the enactment of laws of health insurance which will give compensation to every working man who earns less than \$1,000 a year whenever he falls ill from any cause during his employment. Such a bill has been introduced into the New York legislature and has been studied by the medical organizations of New York State, and it is going to bring up the same sort of discussions and controversies as before the compensation law was enacted. We do not know exactly what the conditions will be, but it will revolutionize the activities of our dispensaries and hospitals, and it will make great changes in the methods of examining and compensating those who are injured nervously.

Dr. F. R. Fry said Dr. Dana mentioned an important matter, namely, the industrial insurance feature. He felt that it is going to figure largely in the solution of this difficult problem.

Dr. L. F. Barker said of course we must distinguish between cases of incontestable organic disease, and those in which signs of organic disease are not demonstrable. But there can be no doubt that there may be just as great disability from a functional as from an organic disease. He believed that we deal here with a matter that psychiatry can help us with. The "organic" neurologists are apt to go too far in the direction mentioned this morning; physicians familiar with psychoneurotic states and psychiatrists will help us to arrive at correct judgments. He believed that the so-called "covetous ideas" or ideas of damages are very important as influences that act on susceptible nervous systems. It seems true that when there is a single payment of damages, the functional disease may last a shorter time than when payment is made by instalments. In estimating damages for incapacity following trauma, it may become necessary to estimate the relative importance of the accident, itself, on the one hand, and of the disposition on the other. If invalid insurance should be adopted, it seemed to him that there might very well be different rates of insurance; people who have a tendency to psycho-

pathic conditions should pay higher rates than people healthy themselves and whose stock is healthy. He believed we shall need to apply the best thought of both neurologists and psychiatrists in order to arrive at just conclusions regarding these perplexing matters.

Dr. E. D. Fisher agreed with Dr. Sachs in regard to many of the patients being malingerers. They are usually, however, honest in their statements. They may overstate their case. They are disabled, they are unable to work, they usually prefer to be at work and that is something we ought to consider. He disagreed with Dr. Sachs in regard to any previous disease or any tendency to disease being considered in estimating the amount of compensation the patient should get. That should depend upon the fact that they have been injured. If they were well enough to do their work before and are now disabled they should be compensated on that basis.

Dr. B. Sachs said with due deference to what the president has said he was in sympathy with his attitude. In fact, it had been his object in every case to discover whether there is any real psychosis present in any case and most of us would be willing to recognize whether there is a hypochondriacal depression or whether it is assumed largely from the fact that that person is suing. The difficulties are extraordinarily great to determine the actual mental attitude of the claimant. He believed the neurologist and psychiatrist will have to cooperate in order to determine the exact mental attitude. He was sure we are all of us going to be extremely careful in this matter. Several cases of distinct chronic psychoses which have antedated the time of the accident had been brought to his notice. For instance, one was a case of paranoia with delusions of persecution; it was claimed that the accident made that paranoia worse. He really believed that in one form or another we shall have to take some very definite attitude regarding this large number of cases which is going to engage the Association during many years.

(a) SYRINGOENCEPHALIA (SYRINGOENCEPHALOMYELIA). (b)
THE FUNCTION OF THE PYRAMIDAL TRACT

By William G. Spiller, M.D.

(a) The author has shown by the previous report of a case that syringomyelia may not be confined to the portion of the central nervous system below the lower part of the pons. Further investigations have led him to conclude that limitation of syringomyelia as usually taught is incorrect.

(b) The case which furnishes the chief arguments for the conclusions expressed above also permits conclusions regarding the pyramidal tract at variance with commonly accepted teaching. (See this JOURNAL, Vol. 44, p. 395.)

A paper by Dr. F. X. Dercum and Dr. J. Chalmers DaCosta, entitled Intramedullary Tumor of Cervical Cord. Probable Diagnosis. Removal in Two-Stage Operation; Gradual Improvement, was read by title. (See this JOURNAL, Vol. 44, p. 97.)

A CONSIDERATION OF SOME SELECTED PROBLEMS IN A
YEAR'S NEURO-SURGICAL SERVICE

By E. Sachs, M.D., and Sidney I. Schwab, M.D.

It is important to study neuro-surgical cases from two points of view—the neurological, which places its emphasis on the production of symptoms in relation to a definitely placed lesion, and the surgical, which emphasizes the

question of the adaptability of a given lesion to surgical procedure. It is this shifting of emphasis at the hands of two differently trained observers which it is believed will eventually satisfy the broadest demand of neuro-surgical cases. Each case is, therefore, studied independently by the neurologist and surgeon; the resulting data are gathered and discussed before it finally becomes either a strictly surgical problem or is discarded into the class of neurological with no surgical outlook.

Among the many problems that have arisen during the past year, the following seven are selected for presentation and comment:

1. The reliability of the Bárány observations and stimulation of the cerebellum in a conscious patient.
2. Significance of albuminuria in intracranial pressure.
3. Multiple lesions.
4. The place of lumbar puncture in intracranial pressure.
5. Pseudo-optic neuritis.
6. Tumors of the Gasserian ganglion and sinus conditions.
7. Disappearance of cord tumor symptoms after lumbar puncture.

First, are the Bárány tests reliable? How accurate are they? A. P., aged 18, had a partly cystic glioma, the solid part of which was 5×3 cm. in size, in the lobus semilunaris superior and lobus semilunaris inferior. The lesion was identical with that reported in a case by Bárány on February 24, 1913, in the Berlin Society of Internal Medicine. Repeated turning and caloric tests were made and were normal. According to Bárány, a lesion of this region causes errors in pointing from below upwards and laterally. After the tumor was removed, the pointing tests were still normal. The patient then developed a large cerebellar hernia. As the entire tumor had been removed, it was fair to conclude that the hernia was due to a separation of the muscles from their attachment. A fascial transplant inserted under local anesthesia repaired this. The rare opportunity of stimulating the cerebellum on a conscious, intelligent patient was thus presented. Though strong faradic currents were used far greater than are ordinarily necessary to get a discharge from the cerebral cortex even under anesthesia, only lateral nystagmus was observed. The lobus medius superior and inferior and lobus semilunaris superior and inferior on both sides were stimulated as well as the tonsilla. The patient had no sensation whatever when the current was applied. Each lobe was stimulated three times. These observations accord with the work of Horsley and Clarke on the cerebellar cortex of monkeys.

From this case, in which the exact portion of the cerebellum involved was determined twice, the conclusion is obvious that Bárány's findings are not constant.

SIGNIFICANCE OF ALBUMINURIA IN INTRACRANIAL PRESSURE

The problem of albuminuria in intracranial lesions is illustrated by this same case. Albumin was present in the urine, and the deposits about the macular region were similar in appearance to those found in albuminuric retinitis. After operation the eyes cleared up completely and only a trace of albumin was found four weeks after operation. First of all, can eye changes in nephritis be distinguished from those found in intracranial pressure conditions? At times the two conditions are indistinguishable. Many cases of albuminuric retinitis have later turned out to have brain tumors. Secondly, to what extent are the eye changes in nephritis due to pressure? There is unquestionably an increase in intracranial pressure in nephritis, but this does not account entirely for the changes in the eye grounds. A decompression was done under local anesthesia in an advanced case of albuminuric retinitis. During the several months in which the patient survived, no improvement in the vision could be demonstrated, but this might have been due to the fact

that the fundi had atrophied to such an extent that they were beyond the hope of repair just as the impaired vision due to tumor does not fully recover if the disc is atrophied. In the third place, does the urine in intracranial pressure show albumin? This case and the two others observed by the speakers recently suggest that intracranial pressure may be one cause for the appearance of albumin in the urine.

MULTIPLE LESIONS

It is a tradition that cerebral symptoms must be explained by a *single* lesion if possible. The preponderance of single over multiple lesions in the brain appears to support this. The following two cases illustrate the fallacy of this teaching. A mentally alert and active lawyer had been suffering from headaches for many years. One day he suddenly developed paresthesia in his right leg. This was followed in a day or two by paralysis of his left arm. Then he became paretic in both legs. Jacksonian convulsions began in his right leg, followed by unconsciousness after the attack. Slight motor aphasia ensued. At this time he was admitted to the hospital. In the next ten days a bilateral choked disc with hemorrhages developed. The patient was very apathetic and had constant intense headache. In the history the following impression of the case is recorded: "The Jacksonian attack on one side with paralysis on the opposite side, a bilateral Babinski and apraxia of the right hand, suggest a lesion near the median line. A corpus callosum lesion more on the right than the left side seems most probable." Operation was advised, but refused. The patient died ten days later. At autopsy *multiple* abscesses were found, one under each motor area and two in the frontal region.

Case two, a butcher, complained of intense headaches, vomiting, and failing vision. There was moderate swelling of his discs, and markedly impaired vision in the right eye, so that no field could be taken. The left field was normal. Further symptoms were a tendency to fall to the right side, vertigo, marked nystagmus, ataxia of the left leg, and periodic weakness of the external rectus. The interpretative note on this case read: "An intracranial process with apparently considerable change in pressure from day to day. Symptoms point to a posterior fossa lesion. Apparently no nuclear involvement in the cerebellum. Definite localization cannot be made." A cerebellar exploration and decompression were done. Great pressure was found, but no tumor. The patient went home improved, his headaches relieved. He developed a large cerebellar hernia, and returned in six months. The right eye was now totally blind. The left eye showed temporal blindness. The X-ray showed at this examination destruction of the posterior wall of the sella turcica. The diagnosis was revised to a hypophyseal process which had been pressing back on the cerebellum. Witzelsucht was very marked at the time. A sella decompression with removal of part of the gland was done. No improvement. Then a second cerebellar exploration was undertaken with negative results. The patient suddenly died ten weeks later with symptoms of a pontine hemorrhage. Autopsy showed multiple lesions due to the cysticercus of the tenia solium. A lesion in the fibers of Gratiolet proved that the progressive blindness had been a homonymous hemianopsia, not a bitemporal one as had been supposed. The Witzelsucht may have been accounted for by a cyst in the frontal region; the cerebellar symptoms by the process about the base of the cerebellum. The immediate cause of death, however, was a pontine hemorrhage.

THE PLACE OF LUMBAR PUNCTURE IN INTRACRANIAL PRESSURE

Lumbar puncture has become such a routine procedure that it is used as if it were without danger. In some clinics it is done even in ambulatory cases. In suspected posterior fossa lesions, or those with marked intracranial

pressure due to a supratentorial process, the authors do not do lumbar puncture. They do *not* believe that doing the puncture with the head lower than the hips makes this a safe procedure. Bad results from lumbar puncture have not been reported as frequently as they occur. This suspicion has been confirmed by a recent article by Schönbeck in which, besides reporting many cases with rather severe symptoms, he records seventy deaths directly due to a lumbar puncture and believes that these represent but 10 per cent. of the deaths that have actually occurred. Most of these have not been published in the literature, or have been ascribed to other causes. The speakers have in the past year had two cases that have emphasized the danger and crystallized their views on the contraindications for lumbar puncture. In both cases there was intense pain in the cervical region and along the first dorsal and eighth cervical segments. Passive movements of the head were painful. The rigidity of the neck, severe pain and its cervical root distribution suggested the possibility of a meningitis, but the absence of fever and clearing up of symptoms in forty-eight hours excluded such a diagnosis. Therefore, as spinal puncture is dangerous in posterior fossa lesions and in supratentorial ones associated with marked pressure, they never do it in the former, and in the latter only after most careful consideration.

PSEUDO-OPTIC NEURITIS

Pseudo-neuritis is a very rare condition and one to which very little attention has been paid. A boy was sent to the authors by an expert ophthalmologist as having a choked disc. The picture was perfectly clear. The boy had headache, no localizing symptoms, and a negative Wassermann. A palliative decompression was done. The eye grounds remained unchanged. Further study on the part of the ophthalmologist convinced him that this was a case of pseudo-neuritis, a congenital anomaly. Wildbrand and Säger, Bordely and others have warned against this mistake.

This case brings up the interesting question, what attitude should the neurological surgeon take in case a patient has a choked disc and no other evidences of intracranial pressure, either general or focal. Since decompression for intracranial pressure is attended by a very low mortality, the authors feel that a palliative decompression is absolutely indicated, and that by early interference alone can the maximum amount of vision be preserved. They believe that this procedure should be followed even more in the case of children, since we have had a number of cases in whom all other general intracranial symptoms were extremely mild or totally absent.

TUMORS OF THE GASSERIAN GANGLION AND SINUS CONDITIONS

Trigeminal neuralgia, with its motor accompaniment known as *tic douloureux*, may be due to sinus disease, a number of unknown factors, and the much rarer condition, tumor of the Gasserian ganglion. The pain in this latter condition is quite different from that of true *tic douloureux*. It is constant, whereas the latter is paroxysmal. The pain of sinus disease may be as constant and as severe as that of a ganglion tumor; fever and a leucocytosis may accompany the former though never the latter. An ocular palsy may occur with sinus disease, but the most important, absolutely diagnostic sign is involvement of the motor branch of the fifth nerve. This was the diagnostic sign in one case on which the authors based their diagnosis. They do not believe it is necessary to wait for atrophy of the muscles of mastication as was done in other cases. Early recognition of this condition promises the only prospect of relief. Their case, the seventh that has ever come to operation, also has a recurrence with a return of pain. They believe more of these cases will be recognized if every case of pain along the trigeminus has its motor fifth nerve examined with great care.

DISAPPEARANCE OF CORD TUMOR SYMPTOMS AFTER LUMBAR PUNCTURE

The complete relief by lumbar puncture of symptoms apparently due to a localized lesion in the cord is in their experience an unusual phenomenon. In September, 1915, Mrs. V., aged 23, showed on examination a saddle anesthesia, bladder and rectal disturbances, and weakness of one leg, and pain in her left leg. Lumbar puncture showed a normal cerebrospinal fluid. Immediately all sensory disturbances cleared up, and bladder and rectal control were regained. The explanation at the time was either that they had evacuated the fluid of a circumscribed serous-meningitis or that the cerebrospinal fluid had been obstructed by a tumor and had been the prime factor in causing the compression symptoms. Up to the present time the patient has had no return of her symptoms, and the most probable diagnosis is believed to be a circumscribed serous-meningitis. An identical case was reported recently before the Philadelphia Neurological Society by Dr. Weisenberg.

It has seemed to the speakers that problems of this sort could with profit be presented here in place of isolated case reports or statistical studies of cases.

PREVENTIVE NEUROLOGY

By Charles L. Dana, M.D.

The importance of neurology in its relation to social problems and preventive medicine: (1) Neurology and mental retardation (epilepsy, habit-neuroses, psycho-neuroses, insanity, neurology and mental hygiene); (2) neurology and its relation to specialization of industrial work (occupational neuroses); (3) neurology and the acute and chronic infections and poisons (chorea, myelitis, neuritis, so-called neuralgias, multiple sclerosis, etc.); (4) neurology and defective methods of study and education (neuroses of childhood and adolescence, psycho-neuroses); (5) neurology and defective metabolism (autotoxemic disorders, glandular and degenerative disorders, thyroid disorders, paralysis agitans, etc., neuralgia); (6) neurology and hereditary disorders; (7) luetic nervous diseases; (8) neurology and arterial disease (hemiplegia, etc.).

Dr. James J. Putnam said that instead of Dr. Dana adding the words of apology for what he says, Dr. Putnam felt that we owe him an apology if we do not give all the attention to these very important suggestions that they are really worth. This collective work which brings the labors of the neurologists in contact with those of other physicians and public health officers, those working with public heredity and the like, is the most important work the neurologist can do. Dr. Putnam voted with regret for the disbandment of this Committee, and although he can see that this step was necessary it would be an excellent thing if a certain time should be allotted each year at the annual meetings to the consideration of our obligations to the community. Dr. Dana has opened a number of doors which should not be closed.

Dr. Charles L. Dana thought that something definite and practical might be done by getting a research laboratory to take up some one of these problems in collaboration with medical men.

NOTES ON THE TREATMENT OF MENTAL TORTICOLLIS

By L. Pierce Clark, M.D.

The nature of the disorder as shown by a complete analysis of four cases. Successes and failures in the psychological treatment and the hypothetical reasons for the latter.

Dr. James J. Putnam said that papers of this kind ought to be welcomed

by the general neurologist because they open the door which everyone wishes to see opened towards the acceptance in the most rational form of what is known technically as the psychoanalytic movement. That is simply a recognition of the fact that our conduct depends in part upon causes lying hidden within ourselves, the existence and bearing of which it is difficult to recognize. They cannot be known until we choose to study them with care. Many of our acts are instinctive attempts to cover and disguise our real motives. They are "reactions of defense" and should be studied from this standpoint. Whether it will prove that we have to depend entirely upon the psychological character analysis for the final treatment and understanding of the case, or whether we have to go more into physiological questions on similar lines is of course a matter that will have to be determined later.

Dr. Harvey Cushing presented "The Report of the Cancer Commission."

Dr. Charles L. Dana said there is a line of inquiry in connection with cancer which would be extremely interesting; that is, the relation of cancer of the breast to metastatic tumors of the brain and cord. Such metastasis had occurred in the speaker's experience so often that he viewed with trepidation operation on the breast.

Dr. Smith Ely Jelliffe said there is one phase of the cancer problem that should interest the neurologist, even though the connection has not been sufficiently studied. This interest lies in the study of the vegetative neurological mechanisms that underlie tissue hyperplasias. Timme, of New York, has experimentally attacked this problem and his papers in *JOURNAL OF NERVOUS AND MENTAL DISEASE* have shown that experimental tissue hyperplasias of the gastric mucosa, closely resembling carcinoma, may be produced by interfering with the balance of the sympathetic and parasympathetic impulses. The close relationship of perverted vegetative neurological mechanisms not only to recurring physical stimuli, as in the case of the pipe smoker's lip cancers, the chimney sweep's scrotal cancers, but also to psychical stimuli suggests another field, which, because it cannot as yet be reduced to "mathematics," is regarded as pseudoscience by many. To such Dr. Jelliffe would modestly suggest a reading of Gilbert Murray's charming little introduction to Thomson's Greek Tradition.

Dr. Archibald Church said it had been his misfortune to see a number of women who have had cord metastasis from the breast during the last three years. What is the route for this metastatic implantation? After reading the lymphangogenesis of ascending neuritis as published recently by English observers, it occurred to him that possibly the route for the metastatic migration might be by way of the intercostal nerves. He felt it might be a reasonable hypothesis that through the lymphogenous tracts of the intercostal nerves the cancer cells might travel from the breast to the dorsal spine and he had some material in hand under search for the purpose of determining whether this may be the route.

Dr. L. F. Barker wished to speak of a practical point, namely, the relief of root-pains in carcinoma of the spine. We all know how often morphine wears out and how the dose has gradually to be increased. Schlesinger suggested a formula that Dr. Barker has used extensively with patients in the Johns Hopkins Hospital with great satisfaction to prevent pain of this sort. Two doses a day will usually keep the patient easy. The formula is as follows:

Scopolamin Hydrobrom.	0.0025
Morph. Mur.	0.2
Dionin	0.4
Aq. dist.	10.0
M. vii hypo, every 12 hours or oftener.	

It is made up sterile.

The doses of scopolamin and of morphine are small, but it is remarkable how the mixture assuages pain. Half an ordinary hypodermic syringe of morning and evening will generally suffice. The patients awake refreshed, clear-headed, and without nausea.

Dr. Harvey Cushing thought it is quite evident from this discussion that the matter is of considerable concern and interest to this Society. He gathered that the primary object of the Commission is to bring before the lay public the importance of cancer in order to spare the many victims of malignant growths from the neglect of early treatment. He did not quite see why the designation cancer should be used, unless the term covers all malignant growths and is used to arouse the laity. For if the investigation excludes the malignant growths of the central nervous tissue, it would perhaps be of less concern to neurologists.

Dr. James J. Putnam read a paper entitled *Acroparesthesia*. (See this *JOURNAL*, Vol. 44, p. 193.)

Dr. Sidney I. Schwab asked Dr. Putnam to explain the very common etiology met with in acroparesthesia in a group of women who use their hands many hours a day washing clothes, exposed to differences of temperature. Some of these cases can be benefited and a few can be cured by the simple means of telling them not to use water on their hands for a period, which is rather an easy therapeutic treatment. He did not see how this is an adaptive mechanism.

Dr. Smith Ely Jelliffe said three cases of acroparesthesia came to his mind as illustrating three possible groups. The first was a result of vegetative nerve disorder, particularly an endocrinopathy with predominant thyroid involvement, a hypothyroidism. It was much relieved after a few months' treatment by thyroid. The second belonged to the sensori-motor group. The acroparesthesia was purely a mechanical affair, due to a diffuse carcinoma of the vertebral column with pressure upon thoracic nerve roots. Death occurred after two years. The third case belonged distinctly in the psychogenic group and improvement has occurred under psychoanalysis. Acroparesthesias may belong to any of the three groups, vegetative, sensori-motor or psychic. Dr. Putnam has placed emphasis upon the psychogenic group. Dr. Jelliffe's observations point to the inference that most acroparesthesias have large psychogenic components. Many an individual with marked arteriosclerosis will react to emotional material by means of acroparesthesias. The symbolic significance of the localization of the sensations is worthy of study. This phase of the subject is considered trifling by the ultra-organicist, but it is a living problem.

Dr. Hugh T. Patrick ventured to make a very unscientific, but he believed practical suggestion. He believed with Dr. Jelliffe and with the president who has gone into the question in the past, that these groups creep over into each other. He was sure we all have the experience of being unable to place a given case in a given group and we are driven to trying various remedial procedures and agents in the hope that we may cure the case or relieve the patient. Some of these patients are very promptly and permanently relieved by a very simple procedure, the suggestion of which he got from Dr. Moyer, which is elastic constriction. He did not know what group of cases, nosologically, it relieves. One might conclude from the success of the treatment what the nature of the case is. He was not sure just how they are relieved. The application of the rubber tubing or elastic rubber bandage about the extremity two or three times a day for two or three minutes will absolutely and completely relieve some of these cases in a very short time. The last case he had was in a young woman, wife of a physician, who was driven nearly frantic by this paresthesia in the hands. She was taking morphine. Her husband writes that she was promptly and completely relieved by the elastic constriction.

The constriction is to make congestion. The constriction is at the upper part of the extremity. In the case mentioned it was in the midhumeral region. One thing that has occurred to him, he can go back to the early days of the use of the Esmarch in surgery. The surgeons who were using the tourniquet objected to the Esmarch because after its use there was an unusual amount of capillary oozing. It is a question whether the congestion has anything to do with it and whether it is not an influence on the nervous supply of the vessels, or the effect may be due to the constriction of the nerve trunks.

Dr. Charles L. Dana spoke of a case of acroparesthesia in a woman of fifty in which he had the arm X-rayed. This showed very much thickened and calcified arteries and the paresthesia was undoubtedly due to this condition. The speaker said that there was a group of cases which ought to be watched very carefully on its first appearance. This was the acroparesthesia which occurs at the beginning of combined sclerosis, associated with anemia. These cases can be controlled by early and watchful attention, therefore the somatic origin should always be carefully investigated. The paresthesia occurring in cases of anemia with spinal sclerosis is rather sharply limited at certain segments of the hand or foot, and thence slowly progresses up the extremity. It is not a vague and diffuse disturbance.

Dr. L. F. Barker has seen a case of acroparesthesia due to latent tetany. Usually the Trousseau sign and the Chvostek sign can be brought out in latent tetany.

Dr. Harvey Cushing did not know whether he fully understood what acroparesthesia is. The cases which we are accustomed to place in this group possess a definite organic basis, though many doubtless have a definite functional superstructure and are apt to occur in individuals with more or less unstable nervous systems. The vascular lesions Dr. Dana has spoken of are very common. Many of the cases which formerly were regarded as psychogenic or neurasthenic have been detached from the acroparesthesia group. This is particularly true of those due to a gradual obliterative thrombosis of the veins and arteries, a disorder largely limited to the lower extremities. The acroparesthesias of the greatest intensity and distress are those which have been so common abroad among soldiers, the so-called "trench bite" or "trench feet." This is probably in large part primarily a circulatory disturbance due to the soaking of the feet inside of wet shoes and the associated use of puttees, which impede the circulation. The paresthesias which accompany these conditions have been very serious, and if the sensation of numbness, discomfort and tingling in the extremities is really what acroparesthesia is, these cases are examples of it.

Dr. Putnam said if he had read his paper as it was written it would have been seen that he covered some of the points that have been brought up. He did not fail to recognize what Dr. Dana and Dr. Cushing call attention to, and he has references to two cases where the paresthetic neurosis was induced by a crushing of the fingers. Of course, he does not maintain that psychoanalysis is a cure for organic conditions such as those sometimes here present, but simply that even where there has been an actual trauma there is usually a background of neurotic tendency.

Dr. Schwab calls attention to the exposure of the hands to water as a frequent cause. That this is so is well known; and still more striking is the fact that a case was reported by Oppenheim where a single exposure of the overheated hands to ice seems to have brought on the trouble. What happens under these conditions is, apparently, that a vascular spasm is induced which recurs as a sort of habit; and this is more likely to happen if there is a neurotic temperament in the background.

Dr. Jelliffe speaks of disorders of the internal secretions as a possible cause, and of the benefit to be expected from thyroid preparations. Dr.

Putnam tried thyroid in one case where he thought it was particularly indicated, but without effect. The same patient received benefit later from a thorough irrigation of the bowel, continued for some time.

He was pleased to learn of Dr. Patrick's experiment with the Bier treatment, through the use of the elastic ligature, and should certainly favor its use. He has, indeed, used this treatment in former days a good deal, for a somewhat kindred angioneurosis of the feet, and found it of distinct value. He also agreed with what Dr. Moyer had said.

He hoped it will be understood that he is not laying stress on the neurotic temperament as the sole cause, or, indeed, asserting any condition to be the sole cause. Arteriosclerosis is not infrequently present in a marked form, and arthritic disorders of the fingers are very common. In his paper he had called attention to an excellent study by Curschmann, who points out the analogy between this disorder and so-called false angina pectoris, and the occasional association of both of them with migraine. He also points out that this group of disorders is often related, in a functional sense, to sexual excitability, and thinks that special attention should be given to this element in the treatment. Illogically enough he couples this opinion with the statement that this benefit is not to be expected through psychoanalysis, and thus throws aside what is obviously the only means of meeting such constitutional, neurotic tendencies in a thorough manner.

The general aim of Dr. Putnam's paper was to emphasize the fact that, let the etiology be, in other respects, what it may, the symptoms occur in obedience to certain principles the action of which one can study to best advantage through observations made on the psychoneuroses.

Dr. Peter Bassoe, Chicago, and Dr. C. L. Shields, Salt Lake City, presented a paper entitled *Diffuse Endothelioma Enveloping the Spinal Cord in its Entire Length*. (See this JOURNAL, Vol. 44, p. 385.)

Dr. Foster Kennedy asked Dr. Bassoe whether he had seen any such cases associated clinically with what appears to be an osteoma of the skull. He had had an opportunity of seeing three such cases and following one of them. These three cases presented clinically the same feature: a large bony tumor of the skull without signs of pressure. The cases were operated on, the bony mass was removed with difficulty, considerable shock ensued; there was then found a diffuse smearing of the dura with tumor material. In one of these cases the symptoms were of gradual deterioration and death.

Dr. Harvey Cushing said that in a series of about one hundred examples of endotheliomata he had seen a number of different varieties. Many of these tumors have heretofore been called sarcomas and whether this tumor of Dr. Bassoe's is really of this nature he did not know. The condition Dr. Kennedy spoke of he had seen. There have been ten or twelve cases in which there was a marked stimulation of bony growth overlying the tumor. In the majority of the cases of this type the tumor had a parasagittal point of origin and the associated osteoma has occupied a midcranial position. However, it is just as common for the overlying bone to show pressure absorption.

It is his feeling that these tumors have not a dural but an arachnoid origin and that they arise from the endothelial cells which cover the arachnoid tufts. These tufts have the same histological character as the tumors. In the primary tumor of Dr. Bassoe's case there were no typical cellular whorls, and indeed in many of the tumors fibrous elements far outnumber the thelial ones, although both types may be present.

Not uncommon, too, are the conditions in which, contrary to a single isolated tumor, flat meningeal growths are found—what Dr. Kennedy has spoken of as tumor smearing. In Dr. Cushing's experience, however, tumors of this type appear in the gross to be subdural rather than subarachnoid as

in Dr. Bassoe's case. If the original tumor in his case was an endothelioma, a sarcomatous degeneration presumably has taken place with invasion of the cerebrospinal space and extension of the tumor just as we see when a glioma reaches the surface and overflows, as it appears to do, into the subarachnoid space, under which circumstances it may extend the whole length of the spinal cord.

Dr. Peter Bassoe had not seen the literature in connection with the tufts that Dr. Kennedy mentions, but he had a case, on which he was working, of a perivascular endothelioma, involving the parietal and occipital lobe. It is intradural and right over it there is a marked thickening of the bone. As to the sarcoma and endothelioma question, that is a very long one. He would simply say that if he were shown a slide of the tumor above the cerebellum without being familiar with the history of the case, he would call it a fibrosarcoma, and any other part of the pial tumor would pass for a round cell sarcoma. There were whorls, but no connections as in psammoma. The relationship between these diffuse endothelial tumors and the multiple central neurofibromata is interesting, because there are cases on the borderland. Also the relationship of this condition to the so-called diffuse glioma of the pia as described by Spiller is interesting. These tumors may all really arise from primitive neural cells, as suggested by Verocay, in which case we would consider them of congenital origin, arising at different stages of development and they should be called neurinoma.

INSANITY—THE PHYSIOLOGICAL, MORPHOLOGICAL AND SEROLOGICAL CHARACTERISTICS

By S. D. W. Ludlum, M.D., and E. P. Corson White, M.D.

Abderhalden reactions have been done on cases of insanity and on animals after experimental removal of glands. In all instances there has been noticeable groupings which developed, by means of reactions, the morphology and the physiological and nervous symptoms.

PRELIMINARY REPORT ON THE USE OF THE ABDERHALDEN REACTION IN MENTAL DISEASES

By Henry A. Cotton, M.D., E. P. Corson White, M.D., and W. W. Stevenson, M.D.

Review of recent investigations. Technique of the method. Nature of the reaction. Experimental evidence of the relation of the reaction to disturbance of the ductless glands. Also demonstration of pathological brain lesions coincident to the changes in the endocrin system. Type of mental cases investigated. Analysis of results in 200 cases. Relation of vagotonic and sympathetonic states to the type of mental diseases. Important physical symptoms described especially in dementia praecox.

THE AUTOLYSIS OF NITROGENOUS COMPOUNDS IN THE BLOOD SERUM OF GENERAL PARALYSIS AND DEMENTIA PRAECOX WITH ITS BEARING UPON THE ABDERHALDEN TEST*

By H. Douglas Singer, M.D., M.R.C.P., and W. B. Quantz, Ph.D.

From the Laboratory of the Illinois State Psychoanalytic Institute.

Estimations of the increase of amino-acid nitrogen in blood serum during incubation for twenty-four hours with brain substrate which had been washed

*The full text published in the Arch. of Int. Med.

with boiling water a varying number of times gave the following average results in milligrams per c.c.:

	No. of Cases	Increase After 24 Hours Without Substrate	Increase After 24 Hours With Brain Substrate which Had Been Washed			
			2 Times	4 Times	6 Times	11 Times
Normal.....	2	0.016	0.103	0.057	0.025	0.021
General paralysis.....	5	0.012	0.154	0.122	0.087	0.045
Dementia præcox.....	5	0.016	0.123	0.048	0.033	0.023

Estimations of the increase of total non-coagulable nitrogen in blood serum treated with placenta substrate for ten minutes only and then incubated for twenty-four hours gave the following average results in milligrams per c.c.:

	No. of Cases	Increase After 24 Hours Without Substrate	Increase After 24 Hours Subsequent to Treatment for 10 Mins. With Placenta
Normal.....	4	0.131	0.335
General paralysis.....	5	0.026	0.328
Dementia præcox.....	4	0.128	0.322

From the above results and the fact previously published¹ that the water which had been used for washing substrates is capable, when used as a substrate, of giving rise to positive Abderhalden tests, the conclusion is justified that the protein which is split up in these tests is that of the blood serum and is not derived from the substrate. Further, that the substrate acts only by neutralizing the antitryptic properties of the blood serum.

From placenta substrate there can be extracted by water or normal salt solution certain nitrogenous bodies which are largely in the form of ammonium salts and urea. Positive Abderhalden tests were obtained with blood serum from a case of general paralysis when ammonium chloride was used as a substrate.

Comparisons, in the three groups of serums examined, between the proportion of total noncoagulable nitrogen present in the form of amino-acid nitrogen in the two sets of figures given above, between the antitryptic titre shown by the increase in amino-acid or total noncoagulable nitrogen according as a substrate was or was not used and between the ratio of noncoagulable to total nitrogen reveal a striking similarity between blood serum from normals and dementia præcox patients with a marked divergence for that from general paralytics.

The following conclusions were drawn:

Substrates neutralize antitryptic bodies in the blood serum, thus permitting fermentation of the nitrogenous constituents of the serum. This autolysis will, if not carried too far, cause a positive Abderhalden reaction.

The Abderhalden test is of no value as an index of disease of, or disorder of function in, any particular organ.

These three papers were discussed together.

Dr. David I. Wolfstein said Cincinnati has recently become the Mecca for epileptics, these unfortunates are flocking there from all parts of the country to consult Dr. Reed. Expressing Dr. Wolfstein's personal views, he thought this Association should exercise extreme caution lest it give countenance to a therapeutic procedure in epilepsy which has not back of it proper

¹ Arch. of Int. Med., 1915, Vol. XV, p. 724.

scientific proof. The theory that intestinal stasis and constipation may have influence in the production of the epileptic seizure is fascinating and perhaps possesses restricted validity, but Dr. Wolfstein is not convinced that it has the general broad value attached to it by the gentleman in question. The cause of epilepsy, according to Reed, is a definite microorganism, a germ which he claims to have isolated pure, to have cultivated; and as fulfilling Koch's main criterion for the specificity of an organism Reed also claims to have produced by its inoculation in animals—two or three rabbits—definite convulsions of epileptic type. Furthermore, Dr. Reed believes so-called idiopathic epilepsy to be a disease definitely communicable from person to person—that is, infectious. One of his normal control animals licked the wound of one of his inoculated animals and soon developed convulsions. This fact appears to be the basis for broad generalizations on the infectious nature of epilepsy in man. Dr. Reed showed smears at a recent meeting of their Research Society. These smears were made from the blood of patients taken during attacks or shortly thereafter. They were also identical with smears from pure cultures obtained from inoculated animals. It is a very large bacillus, surprisingly like the common hay bacillus. If there have been detailed reports of cases with accurate clinical histories from Dr. Reed's clinic Dr. Wolfstein had not seen them. At any rate we should, as neurologists, reserve judgment in this whole matter of the causative relation between intestinal stasis, constipation and epilepsy, as well as with regard to the validity of Reed's bacillus until further confirmation of his findings from competent sources appears.

Dr. C. B. Burr asked Dr. Ludlum what in the absence of any knowledge of a new patient's previous history or without other examination, physical or mental, he would be able to infer from any particular reaction as to the form of disease present, or how far the reaction would serve as a guide to subsequent inquiry and examination.

Dr. L. F. Barker asked whether it would not be well to inform general practitioners that epilepsy is a symptom, not a disease, and that cutting out the large intestine will not cure it. Now and then intestinal stasis may be a factor, but if patients are to be operated upon for intestinal stasis the greatest care in the selection of cases should be exercised.

Dr. Hugh T. Patrick said Dr. Wolfstein had inadvertently given us an opportunity of protesting. In the west there are a good many pilgrimages to Cincinnati for this abdominal operation for epilepsy. The operation is not only a very serious one, but the basis of its performance cannot be said to be scientific. At least it has not been established in a scientific way. And what Dr. Patrick wished to say, what he thought he must say, was that he had been informed from more than one source that the operator uses methods not only unscientific, but ethically condemnable. He had been informed that follow-up letters are sent to patients and prospective patients. Consequently it is our duty to caution patients against this operation and this operator.

Dr. Smith Ely Jelliffe said similar experiences are now almost a by-word. Eye muscle cutting for the cure of epilepsy had its little day; stripping of the clitoris was much in vogue at one time; ovariectomy was a panacea for a time. We laugh at these enthusiasms, unmindful often of the fact that we are indulging in them ourselves. The intestinal operation for epilepsy is only another instance of faddism going wrong. A few residual results will be satisfactory. These will be attributed to the operation, and touting for practice may be based upon them.

Dr. E. B. Angell asked how much pancreatic extract Dr. Ludlum uses in his cases. He has been in the habit of using in intestinal disturbance extract of the pancreas in tablet form two hours after eating at the beginning of intestinal digestion, and he is curious to know Dr. Ludlum's exact dosage.

Dr. Herman M. Adler gave a word of caution against interpreting the anatomical findings too specifically. The correlation in Dr. Ludlum's cases seems convincing, but so far as affecting any change in the structure of the ductless glands, that remains to be proved. During the past years Dr. Adler has been performing experiments on rabbits in which he fed them hemolytic fats with the object of demonstrating some relation between the anemias and the atrophy of lymphatic tissue, which occurs so frequently in psychiatric cases. After prolonged feeding with huge doses of fat, it was found that the rabbits became extremely emaciated, and showed extreme grades of anemia. They were so emaciated that they had actually acaphoid abdomens. In all these rabbits, however, it was interesting to note that the thyroid gland and the adrenals were immensely enlarged. On histological examination this hypertrophy appeared to be parenchymatous.

Dr. S. D. W. Ludlum said in answer to Dr. Burr's question: We have a reaction to a certain gland, can you tell a priori what this means? Given a reaction of the thymus gland it might mean hypophyseal dystrophy, or preinvolution melancholia, so that simply the reaction would not be enough to make a diagnosis without studying the morphology of the patient and his sympathetic nervous symptoms. The reaction means that this is simply one more of the symptoms of insanity and is not necessarily a cause and does not mean that the cure of insanity is going to come through the ductless glands, but is one more link in the chain of etiological factors.

Dr. Henry A. Cotton said that in his paper he mentioned some work that had been done in regard to the relation of intestinal stasis to epilepsy. While he did not subscribe to all in the article in question, he thinks that the work concerned with the intestinal condition is probably corroborated by other investigators. It is a well-known fact that epileptic convulsions are influenced considerably by the diet, so it seems fairly well established that the intestinal stasis plays an important factor in the production of convulsions. The correction of intestinal stasis alone probably will not cure epilepsy if there are other factors which are not attended to, nor is it claimed that pancreatin is a cure for epilepsy, but it certainly exerts a marked influence on the frequency of the convulsions.

Results of the Abderhalden tests in these cases correspond with the physiological work by Cannon, especially in regard to the hyperactivity of the suprarenal gland. Therefore, they reported these cases as a part of their investigation as they consider it an important contribution to the pathogenesis of epilepsy.

Dr. H. Douglas Singer simply emphasized the importance of exercising great caution in drawing conclusions from such results as those reported by Drs. Ludlum and Cotton. They had observed that, using the serum of normal animals, substrates prepared from the glands of internal secretion appear to be quite efficient in the neutralization of antitryptic materials.

THE HISTOLOGY OF SELECTED AREAS OF THE CEREBRAL CORTEX IN DEMENTIA PRÆCOX

By E. E. Southard, M.D.

The material examined was selected from cases already studied clinically and anatomically, with systematic brain photography, and was designed to include examples of cases with normal-looking brains, with conditions suggesting congenital origin, and with conditions suggesting acquired nature. The areas had been selected as those about which we know most physiologically. The

studies were confined chiefly to the question of nerve cell loss and neuroglia cell increase.

A paper, "Dementia Præcox Associated with Uncinariasis," by Dr. Eugene D. Bondurant, Mobile, Ala., was read by title.

A paper by Dr. Theodore Diller, Pittsburgh, "Prognosis of Dementia Præcox," was read by title.

CHICAGO NEUROLOGICAL SOCIETY

MAY 18, 1916

The President, DR. JAMES C. GILL, in the Chair

HEAD INJURIES OF WARFARE WITH SPECIAL REFERENCE TO LESIONS OF THE SUPERIOR LONGITUDINAL SINUS

By J. Elliott Royer, M.D.

Dr. Royer said that at the National and King George Hospitals, London, he had the opportunity of seeing and dealing with a number of war injuries of the nervous system. The most frequent injury to the superior longitudinal sinus is the one disturbing or blocking the parietal circulation, causing both motor and sensory disturbances. Occasionally the missile produced a laceration of the sinus, or of its lacunæ, but most frequently it was the depressed skull compressing the sinus or lacunæ, causing a thrombosis in a part of the sinus, and the superior superficial veins entering the sinus at the position of the wound. The following case illustrates the disturbance of the sinus and its parietal drainage of both hemispheres. Private, June, 1916, received a rifle-bullet wound a little to the side and over the left parietal area. No operation was performed, except to smooth the edges of the wound. When seen by Dr. Royer, three months after the injury, he said the last thing he remembered before the injury was having his head on a level with the parapet of the trench, and the first thing remembered was finding both legs and the right arm rigid, powerless, and unable to appreciate their position in bed. He said the rigidity had lessened with the continued but gradual return of power. On examination the left upper limb was normal in every respect, the right upper limb was definitely weak and rigid at the elbow and shoulder, and practically normal at the wrist and fingers. The lower limbs lay extended; all movements were limited; ankle movement almost nil, and toe movement lost.

The reflexes of the upper limbs were normal. Knee and ankle jerks were more active on the right, on both sides were an ankle clonus and plantar extensor response. The sensory disturbance was of a pure cortical type. He continues to improve and walks with slight assistance. The paralysis and rigidity increase distally in the lower extremities and conversely in the affected upper extremity, with very slight involvement of the hand, indicating that the center for the wrist movement is on the dividing line of the area drained by the inferior and superior superficial cortical veins that drain the central gyri, and corresponding in relative severity to the recognized order of arrangement of centers of movement of the toes, ankle, knee, hip, trunk, shoulder, elbow, wrist, and fingers. The symptoms on the left side indicate that the thrombosis extended to the right side sufficiently to block the smaller veins draining the apex and mesial surface of the motor and sensory area. The early rigidity with no flaccid period, the sensory phenomena giving no

evidence of shock, the segmental distribution of the paralysis, and the nature of improvement, are in contrast to the well-known phenomena usually observed in cerebral disturbances (hemiplegias) due to arterial disorders. These sinus cases explain the heretofore not well recognized disturbances of the sinus found in civil life. In the treatment, experience taught that in most cases an attempted local surgical remedy was only to increase the existing thrombosis, and in many cases to make the condition irremediable, by producing further hemorrhage and a complete thrombosis of the sinus, its lacunæ and the cortical veins. Conservatism was the keynote in the surgical treatment of general cerebral injuries. Every case received a thorough neurological examination, and upon the findings procedure was based. Notwithstanding the septic condition of many wounds, general meningitis or encephalitis was strikingly rare. The tendency was to do as little as possible surgically at the site of the wound. If strangulation of brain substance was imminent and lumbar puncture did not relieve the pressure sufficiently, a contralateral decompression, rather than enlarging the opening at the site of the wound, was generally considered preferable. No general law, however, was laid down. Every case was treated as an individual one. To Doctor Buzzard, of the King George Hospital, Dr. Royer is indebted for permission to report the case.

CASE OF MULTIPLE SCLEROSIS WITH ABDOMINAL REFLEXES

By Hugh T. Patrick, M.D.

Dr. Patrick presented a man whom he had seen first in February, 1916, when he was forty years old. Eighteen years ago he began to have frequent micturition, with difficulty in completely emptying the bladder and a tendency to dribbling afterwards. This lasted for four or five years. Then he was all right for several years. Then the trouble recurred and has continued more or less ever since. He also has some difficulty in starting the flow of urine. Ten years ago vision began to fail, and from the beginning he noted that peripheral vision was better than central. This difficulty in vision gradually increased until now he can read only half-inch letters. Eight years ago he first noticed difficulty in walking, which began in the left leg and the left has continued worse than right. Five years ago he began to have clumsiness in the left hand, and at the same time the right leg became involved. Twenty years ago for a considerable time he had diminution of sexual desire and imperfect erections. This may have been functional. Nine years ago sexual power again began to fail, and the last four or five years it has been *nil*. About five years ago he began to have a little difficulty in speech, a little clumsiness and slowness. Five years ago, when in Dr. Mix's care, blood Wassermann was negative. A recent Wassermann was made on the spinal fluid, which was also negative, with only four cells and scarcely any globulin.

Now the examination shows spasticity, double ankle clonus, double Babinski, and increased arm reflexes. There is a very distinct ulnar jerk of peculiar type, flexion and pronation of the forearm, and flexion of the fingers. He also shows a peculiar though slight cyanosis of the left hand. There is slight jerky incoordination of the hands. Visual fields show a large central scotoma for either eye and there is double optic atrophy. Dr. Patrick could but confirm the diagnosis of multiple sclerosis made by Dr. Mix.

The only reason Dr. Patrick brought the man to the Society was to show a case of multiple sclerosis which seemed distinctly to be of eighteen or twenty years' duration—far advanced—and yet showing abdominal reflexes. To be exact, the last time he examined the man, two months ago, he showed abdominal reflexes. The right upper was normal; right lower absent or doubtful. Of course, the lower abdominal is absent in a good many people. The left upper was present but diminished, and the left lower absent. He

also had a cremaster reflex on one side, which should be lacking in a case of advanced multiple sclerosis. Examination at the meeting showed the abdominal reflexes to be absent, except a faint trace of the right upper.

Dr. Hamill asked if, when the upper reflexes were present, there was a Beevor.

Dr. Patrick said that there was a very slight one, which is still present. There were some very slight sensory signs in the legs, but aside from this particular feature there was nothing of very special interest in the case. It was just the ordinary long, fluctuating case of a multiple sclerosis.

Dr. Patrick supposed all the members had seen incipient cases, or those of localized type, with the abdominal reflexes retained, but it surely must be very unusual for a case with as much paraplegia as this man had and such an extensive process—extending from the optic nerve and involving all the extremities and the bladder—to retain the abdominal reflexes.

Dr. Charles L. Mix asked how much spinal fluid was used for the test.

Dr. Patrick replied that Dr. Harris made the test, and he always uses one c.c., only occasionally two c.c. The four lymphocytes are not at all unusual in multiple sclerosis.

It might be of interest to say that three years ago he heard Alzheimer say that there was always lymphocytosis in multiple sclerosis. That certainly is not the case, but he thinks it is fair to say that it is always present in acute exacerbations of the disease, and it is not unusual to get as many as four lymphocytes, as in the case presented.

Dr. Charles L. Mix said that one interesting thing in the case was the tremendous exacerbation of the symptoms on an attempt to treat the man with injections of strychnin. The man was first seen by Dr. C. H. Beard, who made a diagnosis of a primary optic atrophy without any known etiology. He afterwards came into Dr. Mix's hands, and he made a diagnosis of multiple sclerosis, and so explained the optic atrophy. Dr. Beard had put him on large doses of strychnin, which made him very distinctly worse, and the man attributed all of his trouble to that. Dr. Mix is of the opinion that strychnin in multiple sclerosis is distinctly a wrong thing to give. However, if any of those present had any suggestions to offer as to therapy, Dr. Mix would be glad to hear them.

Dr. Julius Grinker wished to say that he had under observation a case of the cerebellar type of multiple sclerosis for about twelve years in a boy who developed the disease with attacks of vertigo as perhaps the earliest manifestation of his trouble. He had also transient incontinence of urine, lasting a variable period of time, which disappeared and returned several years later. Toward the last he presented the most classical picture of multiple sclerosis, and there was no question then as to the diagnosis. The entire course of the disease covered sixteen years. The therapy in that case was occasionally sodium bromid in ten to fifteen grain doses, *t. i. d.* This was used at first experimentally but the patient would regularly return saying that he had felt much better after taking the medicine, that nothing he ever took before helped him as much. It was most effective when he became very nervous as the result of locomotion, which was both spastic and ataxic. The remedy was prescribed in occasional doses over a period of two or three weeks, with interruptions, and always gave him marked temporary relief.

Dr. Harold N. Moyer was reminded of a patient he had seen that morning with a caudal injury at the level of the first lumbar vertebra, accompanied by bladder symptoms. The surgeon reported to the speaker that the cremaster reflex was absent. Stroking the inside of the thigh, Dr. Moyer got a distinct cremaster reflex on both sides—much to the surprise of the surgeon. A second was devoid of response. It was then found that if the stroke were made on the inner side of the thigh it failed to bring the reflex, but if on the front, over the distribution of the crural nerve, a distinct jerk was ob-

tained. Testing further, it was found that pinching the inside of the thigh produced a sharp cremaster jerk. It is evident that in organic involvement of this reflex arc there probably is a response in varying degrees, which differs from time to time in the same patient. These symptoms of disappearance of certain apparently organic symptoms occur in quite a considerable proportion of the cases.

Dr. H. Douglas Singer asked Dr. Patrick if he had any actual figures on the cases in which the abdominal reflexes are present. He would not like to say definitely, but he was pretty sure he had seen them present in not a few cases, even in advanced disseminated sclerosis. Of course, he knew that they were most frequently absent. That has been one of the rather extraordinary features in connection with the difference in behavior of the superficial and deep reflexes. The superficial reflexes tend rather to be diminished whenever the knee jerks are increased, and vice versa, for which the speaker had no explanation to offer.

Dr. Sydney Kuh said his personal experience coincided with that of Dr. Singer. In fact, he thought he could go a little further and say that, so far as his experience was concerned, absence of the abdominal reflexes, at least in the earlier stages, has been the exception rather than the rule. While absence of the abdominal reflexes may be of diagnostic importance in a case of disseminated sclerosis, their presence would be of absolutely no value. This, of course, applied to cases of shorter duration than the one presented by Dr. Patrick.

Dr. Kuh did not recall ever having seen a case in which the disease had lasted so long as in the one presented.

Therapeutically, he would suggest that it might be worth while to try something like one of the old remedies. Of course, it would be very difficult to form any opinion as to their value in a disease in which spontaneous fluctuations are as common as in multiple sclerosis, but he was under the impression that silver nitrate was not entirely without value.

Dr. Ralph C. Hamill said it seemed to him, considering the outburst of symptoms that we see in multiple sclerosis that there is something to be considered, from the standpoint of etiology, as to a microbic origin. If of germ origin, there might be groups of bacteria thrown out into the circulatory system which, lighting in the central nervous system at intervals, would cause sudden accessions of symptoms, with gradual recessions whenever complete, but with a certain amount of scarring being left where the destruction had been most marked.

Dr. Hall had a patient a long time ago who came later into Dr. Hamill's service at the County Hospital. This girl had very large tonsils, which were full of pus. Dr. Hamill had them taken out, and the girl seemed a little better following operation. Whether that was the recession or not, he could not say.

Dr. Charles L. Mix said that no one had said anything about what to do for the patient presented. The speaker would not advocate Dr. Grinker's prescription. The patient did about as well on arsenic in one form or another as anything that had been given to him. He had been given cacodylate of soda quite a good deal, and did fairly well on that.

If, as Dr. Hamill said, the condition be based on a microbic etiology of some sort, it would be rational to use cacodylate of sodium, which is especially valuable in spirochetic infections. Possibly, if there were a microbic cause behind the condition, it would not be of the ordinary bacteriological flora.

This man had also been given some mercurial preparations. He was given a little bichloride at times, thinking it might have some beneficial effect, but it did not. The only thing that seemed to have any effect was either the arsenic or the cacodylate of soda.

On one occasion, the speaker did give him some strychnin, to find out whether his idea regarding it was correct, and he had the impression that it did increase the spasticity, making it harder for him to walk. Dr. Mix has adopted the plan of never giving strychnin in any case in which there is a Babinski reflex due to cord disturbance, aside from cerebral disturbance.

Dr. S. Krumholz wished Dr. Patrick would kindly speak at greater length on the question of retained abdominal reflexes in multiple sclerosis. The speaker has seen retained abdominal reflexes or transitory absence of them in a large number of early cases of multiple sclerosis.

The pathogenesis of multiple sclerosis is claimed by many investigators, especially Marburg, to be of an infectious origin. The transition and remission of the symptoms in the disease speak in favor of this assumption. Therefore, in the treatment of multiple sclerosis it would be well to search for and remove focal infections, and administer urotropin, since that drug is regarded by many to act as an antiseptic in the spinal fluid.

Dr. Patrick, in closing the discussion, said he had no statistics in regard to the presence of abdominal reflexes in multiple sclerosis. He was very sure that in incipient cases the abdominal reflexes are frequently present on one or both sides. He thought it very, very rare that they are present on either side in cases as advanced as the one presented—not only as to time, but the degree of the symptoms which the man has had for so long. He is in a period of quiescence at this time.

Dr. Patrick thought the absence or diminution of the abdominal reflexes of very great assistance in the diagnosis of many cases, not only of multiple sclerosis, but of cases in which there is a question whether or no there is an involvement of the pyramidal tract. Oftentimes when the ordinary symptoms of spasticity, increase of reflexes, and the like, are doubtful, a diminution of the abdominal reflexes or reflex, and cremaster as well, on the suspected side, is of very great value in determining whether there be some organic change in the pyramidal tract.

Dr. Patrick thought he would adopt Dr. Kuh's suggestion and give the patient nitrate of silver. The other things had been tried, and he had no confidence in them, including fibrolysin. He has not used any nitrate of silver for many years, but believes that sometimes it is of value.

The cerebellar type, spoken of by Dr. Grinker, has been described for many years.

Dr. H. C. Stevens asked if one was warranted in injecting serum into the spinal canal.

Dr. Patrick replied that one might be justified in trying almost anything. He could not figure out why it should be used, but if the patient agreed to it he would not object to its use, since the dermatologists are seeing such wonderful results from the injection of blood serum, for no particular cause that anybody can explain. He had seen a patient with generalized severe dermatitis who was very greatly improved by the injection, subcutaneously or into the deep tissues, of serum of the blood of his brother. Such cases are quite authentic. There is no question about the result. It is possible that something of that kind might affect multiple sclerosis.

Only that morning he had seen a case which he felt certain was one of multiple sclerosis in a man who had very spastic legs, double ankle clonus, increased deep reflexes, loss of the abdominal reflexes, a trace of a cremaster reflex on one side, and yet had normal plantar reflexes on both sides. He had no Oppenheim, Chaddock or Gordon. Only an occasional indication of the extension of the great toe could be obtained on one side. Uniformly, on the left side, there was practically no plantar reflex at all. On the other side, the worse leg of the two, there was almost uniformly a flexion.

Periscope

American Journal of Insanity

(Vol. LXXI, No. 1)

1. Typhoid Fever with Permanent Memory Defect. D. K. HENDERSON.
2. The Psychic Factors in Mental Disorder. M. A. HARRINGTON.
3. The Thymus and the Pituitary in Dementia Præcox. S. W. LUDLUM and E. P. CORSON WHITE.
4. Mixed States and Atypical Manic-Depressive. H. DOUGLAS SINGER.
5. Behavior Chart in Mental Diseases. E. J. KEMPF.
6. Colloidal Gold and Spinal Fluid. P. G. WESTON, I. A. DARLING and P. B. NEWTON.

1. *Typhoid Fever with Permanent Memory Defect.*—Report of two cases of post-typhoid defect-states, in which the impairment of memory had lasted in one case for four, in the other for ten years. In both instances the attack of typhoid had been very severe and had lasted a long time.

2. *The Psychic Factors in Mental Disorder.*—The mental activities of man are in the main due to impulses coming from natural instincts which must be adjusted to meet the complex requirements of civilized life. Man and the higher animals have acquired the ability of modifying these instinctive reactions to a very high degree though this ability varies considerably in different individuals. Inability to make these adjustments may well play an important rôle in the production of morbid mental phenomena. As illustrative of this the author narrates the following case. The patient was a young man twenty-three years of age, who came to the hospital with a diagnosis of catatonic stupor. He seems to have been by nature indolent, good-natured and timid and had been brought up to a life of idleness, babied a great deal and sheltered as much as possible from all cares and annoyances by a fond mother, who, afraid that he would work too hard, allowed him to loaf at home whenever he found a position hard or disagreeable. He had also become addicted to alcohol and for a year before coming to the hospital consumed about a quart of whiskey a day. He had from early age suffered from morbid fears of water, of accidents on the street, and though he had very strong libido he was obsessed by the idea that he might acquire venereal disease and practiced masturbation. He was specially afraid of doctors, since he thought that by looking at his eyes a physician could tell that he masturbated. As a further link in this chain of circumstances he made the acquaintance of a young girl whom he wished to marry but who refused him, though she still allowed him to caress her, and soon after this there came to the house a married woman of loose morals with whom he was often left alone and who seems to have exerted herself to stimulate his passions, which he was restrained from gratifying for fear of getting into trouble, since he had been warned by his brother of the danger of entering into sexual relations with this woman, and also believed that it was wrong to have anything to do with a married woman. He became more and more irritable, drank heavily and soon began to have ideas of persecution of a sexual coloring,

feared that he might be accused of having raped the woman in question while they were alone, and finally that women on the street were going to blackmail him, accusing him of attempted familiarities. He thought people looked at him peculiarly and finally heard them making remarks about him. A bird having pecked him in the eye, he developed a fear of blood poisoning and irritated his eyes with constant antiseptic applications. When he came to the hospital he was in a stuporous condition, had refused food for five days, retained urine and feces and his weight had fallen from 200 pounds to 145 pounds. He would not speak and had to be fed with a spoon for some time, then began slowly to improve. After eight months he would smile when addressed but still refused to speak. Two months later he read the newspapers apparently with interest and when alone with his attendant would sometimes whisper yes or no. He then would write answers on paper and finally commenced to talk, first with his brother and then with other people. In thirteen months he was apparently in good mental and physical condition. He then had a clear recollection for all the main events of his illness, and said that while he lay in bed apparently dull and stupid, he was really alert to all that was going on and was in a state of intense fear. At first he thought that he was in prison, in which he had been placed for drinking, that his family did not care for him. He continued to worry about his health, feared delirium tremens, thought he would not live long, was aware of his loss of weight, which frightened him, still had the fear of being accused of rape and heard the voices. He said he lay still because he feared to move, was afraid to eat, to urinate, or to defecate. When pricked with a pin he felt it plainly but was afraid to wince for fear he would be put in a straight jacket, would not put out his tongue for fear someone would "give him an uppercut." He got so much better that he was discharged, but suffered so much from fear and obsessions at home that he returned, is still in the hospital, and is gradually growing more silent and less interested. Summing up his condition, its most prominent features are: (1) An intense fear-affect; (2) almost complete motor inactivity. The dominant characters of the patient's personality are timidity or fear, and passivity, as shown by his indolence, giving up as soon as he encountered any difficulty.

The author next reviews the innate tendencies of all animals to protect themselves, laying particular stress upon the flight instinct, which is directly connected with the affect of fear. Tracing the life history of this individual, he finds that his instinct was always to avoid difficulties by shrinking from them, *i. e.*, by flight. Now, life is a constant series of adaptations, which particular method is adopted depending upon a number of factors. The inherited tendencies of this man were doubtless the most important, but masturbation and alcoholic excess strongly increased the natural timidity and fear-affect and strengthened the flight instinct, *i. e.*, the avoidance of difficulties, and in addition affected his general health, which further intensified the natural tendencies. The ground was thus prepared for the delusional system which he actually developed. It is well known that the fear-affect when not too intense stimulates the flight instinct or if the danger is too near at hand to permit escape, the fight instinct preponderates and the cornered animal fights desperately for his life. On the other hand, intense fear-affect causes inhibition, and this seems to have been the case in our patient. This, too, the author thinks would account for the clouding of consciousness present at times. There are two sets of factors in the production of mental disease, the physical and the psychic. The author is by no means inclined to underrate the former and feels that in this patient his physical makeup and especially his intense sexual feelings, whose normal gratification was prevented by the fears of the patient, play in his mind a most important rôle. He thinks that we should by all means devote more study to the psychical factors, those mal-

adjustments which, though perhaps insufficient, when acting alone, to upset the mental balance, nevertheless in conjunction with physical causes may serve to shift the beam of the scale the wrong way. As a contribution to this point of view he gives an extended analysis of this case, of which this abstract presents but the barest outline.

3. *The Thymus and the Pituitary in Dementia Præcox*.—The authors present a preliminary report of their researches on this subject, of which the following is a résumé: (1) "In a group of cases of dementia præcox, Abderhalden reactions were obtained in some instances to testicle and pancreas, and in others to testicle and thyroid, while in still others no reaction could be secured." (2) "In the individuals that gave the reactions to testicle and pancreas there were observed physiological symptoms of the same type as those found in animals from which the thymus had been removed." (3) "In examining the blood of animals whose thymus had been removed, the same reactions were obtained as in the cases of a certain group of patients, indicating that in this group there exists a disease entity." (4) "With regard to the pituitary, there were a considerable number of cases with the symptoms of dyspituitarism that improved with pituitary extract. There were also a group of cases of hyperpituitarism that improved with the opposite organic extract, which is the Brown-Séquard fluid."

4. *The Mixed States and Atypical Forms of Manic-Depressive Insanity*.—While the author acknowledges the clinical usefulness and fineness of description of the Kraepelin conception of the manic-depressive psychosis, he thinks that the "mixed states" therein included tend strongly to the maintenance of the so-called "faculty psychology" which he regards as pernicious. In his opinion: (1) "The essence of the manic-depressive reactions is the occurrence of some appropriate affective attitude of the organism as a whole which is of purposive character, abnormal because of its severity and duration and because there is no apparent external cause for its adoption." (2) "The so-called mixed states and atypical forms are not mixtures simply of certain traits, but represent affective oscillations colored by peculiarities in the makeup of the individual patient. Such modes of adjustment must be carefully studied and weighed in rendering a prognosis in any individual case."

5. *The Behavior Chart in Mental Diseases*.—That a knowledge of the behavior of the patient from day to day and from month to month is of the utmost importance to the physician goes without saying and in all institutions the ward records should be carefully kept. To facilitate this the author has had constructed for the Phipps Psychiatric Clinic a chart for the recording what the patient does or what symptoms he presents daily and monthly, which he describes in this article, and whose value he illustrates by presenting some typical records showing the striking differences observed in different mental diseases.

6. *Colloidal Gold and Spinal Fluid*.—The authors applied the Lange colloidal gold test in the study of 198 cases made up as follows: Cerebrospinal syphilis, 3 cases; paresis, 34 cases; dementia præcox, 98 cases; manic-depressive insanity, 25 cases; epilepsy, 12 cases; cerebral arteriosclerosis, 17 cases, and unclassified, 9 cases. The spinal fluids were also subjected to the Wassermann test, the Noguchi butyric acid test, while cell counts and volumetric estimation of albumen were made.

They summarize their results as follows:

1. In the cerebrospinal syphilis cases the Wassermann reaction on the spinal fluid was always positive and the colloidal gold test "showed a reaction in the paretic zone."

2. In paresis the colloidal gold test was always positive when the spinal fluid gave a positive Wassermann and in one instance was positive when the Wassermann was negative.

3. In dementia præcox, manic-depressive, arteriosclerosis and epilepsy there were no positive Wassermanns and no gold reaction "in the parietic zone," but in eight cases of the 152 there was a gold reaction within the minor limits of the "luetic zone."

4. In the unclassified psychoses the colloidal gold and the Wassermann reactions ran a parallel course except in one case which gave a negative Wassermann but a gold reaction in the "parietic zone." Possibly a case of paresis.

5. They are of the opinion that the colloidal gold reaction forms a useful adjunct to the Wassermann and in some instances where the Wassermann was absent in cases clinically luetic it has seemed to point to the appearance later of a positive Wassermann.

C. L. ALLEN.

Archiv für Psychiatrie und Nervenkrankheiten

(54. Band, 1. Heft)

- I. Tribute to E. Hitzig on the Occasion of the Placing of the Hitzig Memorial in the Clinic for Mental and Nervous Disease of Halle. G. ANTON.
- II. Complete Discussion of a Case of Bilateral Deficiency of the Cerebellum. G. ANTON and H. ZINGERLE.
- III. Familial Dysostosis Beginning at the Time of Puberty. G. ANTON.
- IV. Dangerous Human Types. G. ANTON.
- V. The Influence of Operative Measures in Developmental Disturbances of the Brain, Particularly in Epilepsy. G. ANTON.
- VI. Technique of Experiments on the Brain, Particularly on the Optic Thalami. PFEIFFER.
- VII. Acute Paranoïd Diseases. HANS WILLIGE.
- VIII. Adenocarcinoma of the Hypophysis and Progressive Paralysis. MAX-FRED GOLDSTEIN.
- IX. A Typical Brain Tumor, with Positive X-ray Findings. K. HEILBRONNER.
- X. Determination of the Capacity of the Cortex and White Substance of the Cerebrum through Planimetric Measurements. R. JALGER.

I. *E. Hitzig*.—Anton writes an appreciation of the work of Hitzig and his services to the pathology of the nervous system and to psychiatry on the occasion of the placing of a memorial in the Halle Clinic.

II. *Cerebellar Deficiency*.—Anton and Zingerle describe in detail the anatomy and pathological changes in a case of complete absence of the cerebellum, together with the clinical history of the case, being the first complete description since 1831. The subject of the paper was a child who died at the age of six and one fourth years. The clinical history is somewhat imperfect, but it was noted during life that she tired easily, that she spoke less distinctly than a normal child, and that she was late in learning how to balance her body, and therefore did not stand erect until she reached the age of four, even then requiring support. She was able to use the arms and hands more perfectly than the legs, but all movements were weak and imperfectly performed. At the autopsy a complete absence of the cerebellar hemispheres was noted. The entire weight of the brain and the spinal cord was 870 grams. A detailed description of the conditions found, not only in the cerebellum, but in other parts of the brain, is given, with the various connecting fiber tracts. A point of special interest is that as compensation for the loss of important parts of the brain, other portions were overdeveloped. Among the hyperplastic sys-

tems were a part of the centripetal sensory tracts, a part of the trigeminal nerve, the pyramidal tracts, the substantia nigra, and probably the spinothalamic tract. There was also a relative increase of the cerebral gray matter as contrasted with the white substance. Various other systems of fibers showed certain hyperplasias but less definitely marked. The paper derives its value from the detailed description of the changes throughout the central nervous system resulting from the loss of one of its important components, particularly with relation to the assumption of function by certain unaffected portions of the nervous system as indicated by the anatomical hyperplasia.

III. *Familial Dysostoses*.—In this paper Anton describes a familial affection in which the close relationship between the bony and nervous systems is emphasized. Springing from two normal parents were ten children, six sons and three daughters living, one having died in early infancy. Of the six sons, only one was normal in stature; the others at about the time of puberty all became deformed and showed kyphoscoliosis. Two suffered from cerebellar ataxia and one was somewhat imbecile. Of the three daughters, one showed a slight kyphosis, a second a high degree of kyphosis and scoliosis, with slight ataxia. The third was normal in figure but had a convergent strabismus. Practically from the time of onset, it appeared likely that the disturbance was due to an anomaly of the polyglandular apparatus. It is known that the bony system is particularly liable to be affected by disturbances of internal secretion; and it is altogether probable therefore that such family disturbances as described are due to a defect in the action of the ductless glands.

IV. *Dangerous Human Types*.—Anton in this paper sketches certain types which belong to the delinquent but not the criminal classes. The paper is a somewhat technical discussion of the psychology of such delinquents.

V. *Epilepsy and Operation*.—In this short paper Anton calls attention to the somewhat neglected subject of the possible benefit which might result through operative interference in developmental disturbances of the skull and brain; as, for example, the possible prevention of later epilepsy through removal of blood clots in birth injuries. Several cases of operative interference are reported somewhat briefly, particularly with reference to the relief of epileptic seizures.

VI. *Optic Thalami*.—Pfeiffer discusses in detail the operative technique of experimental investigations of the brain, and especially of the optic thalami, the work upon which he bases his paper having been done in Sir Victor Horsley's laboratory in London. The experimental animals were ten monkeys and thirty-five cats. Following chloroform-ether narcosis, a trephine opening was made and faradization of the desired part made by means of the bipolar needle. The exact method of this procedure is described in detail. The animals were kept alive for at least fourteen days and exact studies made of the disturbance of nervous function occasioned by the operative procedure. The brains were later carefully hardened and cut in order that the exact position of the lesion experimentally caused might be studied in relation to the symptoms produced thereby.

VII. *Acute Paranoid Disease*.—In concluding a very complete article on acute paranoid diseases on the basis of a series of carefully studied cases, Willige reaches certain conclusions of value. The so-called paranoid conditions are given a rather liberal interpretation, and are grouped so far as possible on an etiological basis, from which it appears that definite etiological factors are extremely doubtful and uncertain, and that in most of the cases a single etiology can not be proved. Alcohol appears to be the most important exogenous poison in the production of paranoid conditions. Cocain plays a very doubtful part in etiology. Paranoid conditions occur rarely in conjunction with general diseases. Old age is an important factor. Behind these exciting causes stands a special paranoid psychopathic constitution rather than a general psychic or mental deterioration.

VIII. *Carcinoma of Hypophysis*.—Goldstein describes in much detail a case at autopsy revealing an adenocarcinoma of the hypophysis, which during life had shown symptoms of paralytic dementia. The importance of psychical disturbances in brain tumors is alluded to; and, further, the interesting question of the relation of the glands of internal secretion to disturbances of various sorts, including mental disorders. The point is also made that the preëxistence of syphilis may lead to the development of malignant tumors through the possible elaboration of toxic metabolic products. In the case under discussion this seemed to be probable. The important part played by the hypophysis in relation to the psychic functions, as well as to those of metabolic character, is sufficiently demonstrated and the possible etiological interrelationships between syphilis, hypophysis tumor, and dementia paralytica must be given due weight.

IX. *X-ray in Brain Tumor*.—The value of the X-ray in the exact determination of the position of brain tumors has on the whole not been great. Heilbronner, however, reports three cases in which the diagnosis of tumors at the base of the brain was greatly assisted by the use of the X-ray.

X. *Cortex Measurement*.—Jaeger describes a method with mathematical formulæ of accurate measurements of the brain and white substance of the brain designed to be of value in establishing certain criteria which may serve as standards in measurements of diseased brains. Tables are given of such measurements in several cases of progressive paralysis as compared with normal controls.

(54. Band, 2. Heft)

XI. The Forensic Significance of Neurasthenia. MÖNKEMÖLLER.

XII. The Phases of Mania. P. OSTANKOFF.

XIII. Criminality and Exogenous Irritability in Congenital Mental Defect. MAX KASTAN.

XIV. Experimental Investigations of Lathyrism. G. FUMAROLA and C. F. ZANELLI.

XV. Further Investigations on the Motor Speech Tracts. G. MINGGAZZINI.

XVI. Mental Disorders in Brain Tumor, and their Relation to Diffuse Brain Alterations Caused by the Action of New Growths. (Continued article.) FELIX STERN.

XI. *Neurasthenia in Forensic Medicine*.—Mönkemöller points out that, in contrast to epilepsy and hysteria, neurasthenia rarely comes before the courts in connection with criminal responsibility. This is somewhat remarkable, inasmuch as the transitional forms between this neurosis and pronounced mental disturbances occur with great frequency. The various conditions associated with neurasthenia, such as fatigue, lack of energy, mental states which easily give rise to extreme emotional states, the feelings of anxiety often associated with marked depression or excitement, are all factors which may well have an influence in affecting the responsibility of the individual. It is also true that most of the endogenous and exogenous causes of disease which take part in the production of nerve weakness have as an effect the reduction of mental capacity. Following a detailed discussion of the attitude of various investigators toward the general subject of neurasthenia, cases are quoted with forensic bearing. So long as the exact status of neurasthenia among the neuroses remains doubtful as at present, any definite conclusions regarding its significance must be made with reservations. The possibility of a congenital as well as an acquired neurasthenia is considered.

XII. *Phases of Mania*.—Recognizing the fact that the most important service of modern psychiatry has been the recognition of true disease processes, and the separation of these from the so-called clinical conditions,

Ostankoff discusses the present status regarding mania, and draws attention to the causes of this condition, illustrating his paper by clinical histories. He impresses particularly the fact that the manic state in manic-depressive insanity does not always reach its fullest development, since one or another phase may be weakly developed. Nevertheless, the cases of typical course in which all the phases are well marked must in every instance be included in the group of the manic depressive psychosis.

XIII. *Criminality and Erogenous Irritability*.—Kastan discusses the difficult question of criminal responsibility in connection with congenital psychic defect. Under the heading of degenerative mental disorder, he includes those cases coming from families with hereditary predisposition who show a peculiar tendency to react to external stimuli through mental derangement. Cases are quoted to illustrate the argument which he sets forth. The immediate relation between such defects and criminality is evident.

XIV. *Lathyrism*.—On the basis of experimental investigations with the chick pea—a plant known to the ancients—Fumarola and Zanelli are able to reach the following conclusions. The histological lesions of the cells of the posterior horns induced by chronic lathyrus intoxication in rabbits show nothing truly specific in the morphology of the cell changes. The specificity lies rather in the topography of the altered elements occurring in the lumbar region of the cord and especially in the group of marginal cells of the dorsal horn. The clinical symptoms—namely, spasm of muscles with tremor and increase of tendon reflex irritability—are merely the expression of the changed function of the nerve cells of the ventral horns in consequence of an indirect stimulation exerted upon them by the altered cells of the dorsal horns: a conclusion reached essentially in 1895 by Mingazzini and Buglioni.

XV. *Motor Speech Tracts*.—Mingazzini maintains that the seat of the speech images is bilateral, and that in greater or less degree the right hemisphere takes part in the function of speech. He reports a case which he has studied over a period of five years which bears out this point of view and develops it further. The anatomical details are such as to be impossible of brief review.

XVI. *Felix Stern*. Continued article.

(54. Band, 3. Heft)

XVIII. Mental Disorders in Brain Tumors, and their Relation to the Diffuse Brain Alterations Caused by the Action of New Growths. (Concluded article.) FELIX STERN.

XIX. The Pathogenesis of the Psychoses in the Light of the Abderhalden Theories. MAX KASTAN.

XX. The Question of the Course of Posterior Root Fibers of the Spinal Cord. (Case of degeneration of the fibers of the fifth lumbar roots in man.) M. P. NIKITIN.

XXI. Neuroses Following Accidents Caused by Electricity. CARL ERNST NEUBER.

XXII. Pathogenesis and Therapy of Chronic Alcoholism. R. I. TUWIM, JR.

XXIII. The Skull Capacity in Mental Diseases. J. L. ENTRES.

XXIV. Pathological Anatomy of Dementia Præcox. LEONID OMOROKOW.

XXV. Secondary Degeneration of the Pyramidal Tracts in Porencephalus. S. STUCHLIK-SIROTOW.

XVIII. *Brain Tumor and Mental Disturbances*.—Following an exhaustive study of the mental disturbances in brain tumor, Stern reaches the following general conclusions regarding the grouping of these disturbances:

1. A group which may be classified under disorders of fundamental processes in the perceptive and speech apparatus. In this group at present,

in addition to the recognized disturbances in perception, action and speech, may be included certain akinetic manifestations.

2. Diseases, the analysis of which shows more or less gross disturbances of several sense systems and intrapsychic processes. Among these disturbances are those which, through the constancy of their appearance, are to be referred to the action of space-narrowing processes; above all, to stuporous conditions. Secondly, disturbances which have symptomatic relationship with the most varied exogenous psychoses, in frequency overbalancing the amnesic conditions. Among these may be named delirious states, epileptiform, and hallucinatory psychoses. The conditions leading to the outbreak of individual forms of the psychotic syndrome are in general unknown. In the third place, but more seldom, occur accidental disturbances in which, through the weakness of the brain induced by the tumor, psychoses are rendered possible by endogenous or exogenous causes. A coloring of the mental state through endogenous influences, anomalies of character, initial depression, etc., are more frequent than outspoken hysterical, paranoid, or manic depressive disease. A combination of the individual groups is frequent. From a pathological standpoint, it appears that brain pressure is a necessary condition for the so-called general psychic disturbances, but the height and duration of the pressure alone cannot explain the variety of the psychic disturbances nor their intensity. The individual resistance of the brain against the effects of pressure is widely variable. This fact is reinforced by an investigation of the diffuse histological changes in the brain caused by tumor. It appears that the extent of the brain pressure and the severity of the degenerative processes do not run parallel to each other.

XIX. *Psychoses and Abderhalden Test.*—Kastan concludes that considerable light is thrown upon the pathogenesis of the psychoses through the Abderhalden method, and through the principles based upon it, and that many new questions are presented by the theory, although much still remains unexplained. It is at least clear that great care must be observed in the determination of the findings, and that the condition of the prostate, uterus, and other organs may, for example, be essentially identical in senile dementia and in mentally sound persons of advanced age.

XX. *Posterior Root Fibers of Spinal Cord.*—Nikitin describes a case clinically and microscopically with relation to the course of the posterior root fibers in the spinal cord. A man of forty developed symptoms with bilateral disturbances of sensibility in the distribution of the first sacral and fifth lumbar roots. The period between the appearance of the first symptom—namely, pain—and death, was, for the right side, five months, and for the left three months. The autopsy showed a metastatic tumor on the outer side of the dura corresponding to the exit of the fifth lumbar roots. The investigation of the cord by the Marchi-Busch method disclosed a well marked degeneration of the fifth lumbar root of both sides. A slighter degeneration occurred in the fibers of the first sacral roots, and also an insignificant degeneration in the fibers of the second sacral and fourth lumbar roots. The course of these fibers is traced within the cord, and shows that a part passed into the posterior horns, but the greater number extended upward in a vertical direction. A degeneration of the ventral roots seemed to show a direct association with the degeneration of the posterior roots of the same segment. Certain conclusions are drawn regarding the relationship of the sensory and motor fibers on the basis of the degenerations observed.

XXI. *Electricity Neuroses.*—Formerly the nervous disorders resulting from electrical injuries were placed in the category of hysteria. Later, Hoche pointed out that electrical currents, even in the form of lightning or mechanical electrical injuries, may produce long-continued disturbances of function through direct effect upon the nervous substance without any psy-

chogenetic result. For example, the relation of cataract and other affections of the eyes and lightning stroke has been observed, as well as certain organic changes, both in men and animals. With the increase in the use of electricity, various effects resulting from it have been observed with distinct changes in the finer structure of the nervous system as shown postmortem. In spite of various observations made, however, it still remains difficult to say in any given case whether a structural injury of the nervous system exists or not. This brings up the question in medico-legal practice, whether a patient is rendered hysterical or has actually sustained organic injuries. To illustrate these points, six cases are reported.

XXII. *Chronic Alcoholism*.—Tuwim has studied the question of the pathogenesis and therapy of chronic alcoholism under the following headings: The action of alcohol on personality; its action on the social individual; on the sexual life, and anatomically on the cerebellum. The questions of resistance, length of effect, intensity, and height of the period of excitement, the rapidity of restoration in normal men and in chronic drinkers, and so on, are dealt with. The treatment of alcoholism in general consists in the artificial over-excitement of the nervous system which, as in normal individuals, brings about a rapid exhaustion of the nervous system in its capacity to be excited by the ingestion of alcohol. The use of atropin in this connection is discussed at length. The opinion is expressed that in appropriate cases atropin should be given with the consent of the patient. Alcoholics bear atropin better than temperate persons.

XXIII. *Skull Capacity in Mental Disease*.—In a study of 300 autopsies on persons dying with mental disease, Entres finds the average capacity of the skull to be 1,411 c.c. The average for men is 1,488; for women, 1,326 c.c.; or the average skull capacity of men is approximately 160 c.c. greater than that of women. The average body size of women is 8.13 c.c. less than men. With the same size of body, the skull capacity of women is almost always distinctly greater than that of men. It appears that the skull capacity of persons with mental disease in general does not differ from normal individuals.

XXIV. *Dementia Præcox Pathogeny*.—Omorokow points out that the pathological anatomy of dementia præcox is as yet insufficiently determined. In spite of the well-recognized clinical course of the disease, corresponding changes in the central nervous system are as yet largely undetermined. A case is thoroughly reported, with anatomical findings, the result being that no definite characteristic signs of degeneration were discovered in the structural central nervous system. Nor was it possible to establish definitely any injury to one or another part of the brain. Certain finer alterations extending throughout the brain and the spinal cord, in all parts and in all layers, were found, consisting of degeneration of ganglion cells and widespread chromatolysis. There was also some fatty degeneration and neuroglia alteration. The processes appeared to be both of acute and chronic character. The vascular system and connective tissue remained unchanged. While it may be acknowledged that the pathological anatomical study explains to a certain extent the clinical picture of the psychosis, its pathogenesis remains obscure. The toxic theory as advanced by Kraepelin, resulting from certain changes in the sexual glands, demands further substantiation. Possibly light might be thrown upon this matter through the study of the living organism, the chemistry of the tissues, and the biological processes dependent thereon.

XXV. *Pyramidal Tract Degeneration*.—Stuchlik-Sirotow describes a case of porencephalus, of interest because of the normal spinal cord. This observation has always been of interest to investigators, and is discussed in detail on the basis of this carefully reported case. The explanation of the normal pyramidal tracts in view of the cerebral alterations is not easy

to explain. It is possible that through certain influences in the period of embryonic development the seat of the pyramidal cells in the cortex may be so altered; or that possible mechanical influences may change their position in such a way that they are still intact in spite of apparent destruction of the motor cortex, and hence naturally no secondary degeneration would arise. Recently also Babinski has reported cases of brain tumor in the region of the central convolutions in which no secondary degeneration occurred, presumably due to the fact that the central lying tumors merely exerted an irritative influence on the cells rather than a destructive one. Rondini has observed the still more instructive fact that in certain idiots loss of the pyramidal cells in the central convolutions apparently does not lead to secondary or other changes in the spinal cord. Although the reason for the lack of secondary degeneration under the ordinary principle remains obscure, the fact of an intact spinal cord in cases of apparent destruction of the motor cortex is a matter of great pathologic interest.

E. W. TAYLOR.

The Psychoanalytic Review

(Vol. II, Nos. 1, 2, 3, 4)

1. Some General Remarks on the Principles of Pain-Pleasure and of Reality. PAUL FEDERN.
2. The Unconscious. W. A. WHITE.
3. The Theory of Psychoanalysis. C. G. JUNG. (*Continued from Vol. I.*)
4. A Plea for a Broader Standpoint in Psychoanalysis. MEYER SOLOMON.
5. Technique of Psychoanalysis. S. E. JELLIFFE. (*Continued from Vol. I.*)
6. Contributions to the Psychopathology of Everyday Life: Their Relation to Abnormal Mental Phenomena. R. S. MILLER.
7. The Integrative Functions of the Nervous System Applied to Some Reactions in Human Behavior and their Attending Psychic Functions. E. J. KEMPE.
8. A Manic-Depressive Episode Representing a Frank Wish-Realization Construction. R. REED.
9. Psychoanalytic Parallels. W. A. WHITE.
10. Psychoanalysis. C. G. JUNG.
11. The Role of the Sexual Complex in Dementia Praecox. J. C. HASSALL.
12. Psycho-Genetics of Androcratic Evolution. T. SCHROEDER.
13. Some Studies in the Psychopathology of Acute Dissociation of the Personality. E. J. KEMPE.
14. Psychoanalysis. A. H. RING.
15. A Philosophy for Psychoanalysts. L. E. EMERSON.
16. Religion and Sex. An Account of the Erotogenic Theory of Religion as Formulated by Theodore Schroeder. J. S. VAN TESSLAAR.
17. Some Freudian Contributions to the Paranoia Problem. C. R. PAYNE. (*Continued from Vol. I.*)
18. Translation: Wishfulfillment and Symbolism in Fairy Tales. F. RIKLIN. (*Continued from Vol. I.*)
19. Translation: The Significance of Psychoanalysis for the Mental Sciences. O. RANK and H. SACHS.

1. *Some General Remarks on the Principles of Pain-Pleasure and of Reality.*—Federn renders here a twofold service in his exposition of the two principles of human conduct in their action and the history of their development and in his suggestions to the psychoanalyst of the therapeutical use to

be made of them. The unconscious, in so far as its activity is known, employs only the pleasure-pain principle. Its tendency is constantly toward wish fulfillment and though the element issuing into consciousness from the unconscious may be painful, the idea is originally pleasurable. Unconscious reactions, however, are unequal to the demands of life. Therefore conscious use of the principle of reality was necessarily evolved. This differs from the pain-pleasure principle in its recognition of the time element, which can take account of the past and the future. Unconscious affects and reactions know no modification of time. The reality principle taking account of the temporal element does not require immediate satisfaction and it can devote itself to the best attainment of a given aim. Conscious thinking is able also in distinction to the unconscious to differentiate both the content and the affect of ideas and events. Fear was the earliest factor in the working of the pain-pleasure principle upon the progress of civilization. It caused the repression of individual instincts and particularly by inhibiting sexual freedom gave opportunity for development of new libido satisfactions. Then followed the heroic or religious period when with the inhibition of instinctive reactions through religious motives the libido was removed still further from its original object. The period of morality marks the next step when men aimed to inhibit the desire itself and sought to expiate their sins by repeating through remorse the pains of past conflicts. The ethical conception represents the highest degree of the original principle in the pleasure of self-harmony. But such a reduction of pain gives play to an increased tension of repressed desires. However, as far as repression is successful through defense reactions, protective measures, self-assurance, "prospective tendencies," as these processes have been variously named, the individual escapes conflict and in so far follows the pleasure-pain principle. The reality principle demands great intellectual capacity and fails to offer the immediate premium of the former principle. Its greatest use is in scientific progress and the highest adjustment of individual and social problems. But for most at least the pain-pleasure principle cannot be abandoned but it must rather be adaptively adjusted.

2. *The Unconscious*.—White explains the use of the term unconscious as that of an interpretive hypothesis rather than a spatial descriptive term. By far the greater portion of mental life is not present to consciousness. The latter has been developed in the course of evolution for the purpose of adaptation of the individual to his environment and of changing that environment to meet his needs and desires. It arises wherever there is conflict and necessity for choice, where innate force is always creating conflict in its effort to free itself from its prison of inertia and pleasurable wish-fulfillment, which mark the unconscious. Emotion and intellect are not distinct entities but rather only different aspects of mental life. The former aspect is characteristic of the unconscious, while to consciousness belongs the relational tool of the intellect for cutting into reality and effecting its control. The history of man is the history of his long struggle after such practical results, made difficult and often ineffectual because of the ever-present unconscious tendency to fixation and regression. White gives several examples from early races of this halting but no less sure advance. He also draws an analogy from the somatic side of this relation of conscious to unconscious processes. Tests show how much more efficiently the patient recognizes at the cortical level the stimuli of reality than when only the thalamus is active. Yet the greater effectiveness of the harmony of the two centers illustrates also the value of the combination of intellectual and emotional factors, or of conscious and unconscious, in the psychic sphere. It is merely an hypothesis, but a serviceable one, that knowledge exists in the unconscious in the form of ideas. The ability to reproduce it seems to prove this. Such ideas are readily accessible from the fore-conscious. There is a radical difference, however, in the char-

acter of the ideas belonging to the unconscious. They belong purely to the emotional aspect and represent the pleasure principle. There is therefore no language in which to express them as they exist. They must be symbolically translated into the intellectual language which belongs to the conscious process dealing with reality. Then again the unconscious is the record of the past and when its experience is brought into consciousness it must be translated into the experience of the individual who is ceaselessly becoming and it is therefore at this moment incapable of being relived as it was originally. The unconscious is indeed our past. It is the psychological path representing resistances overcome, dangers avoided. There is danger of fixation along its way or of regression to earlier paths left behind. The great borderland between wholly conscious control and unconscious control suggests the stream of constant influence from this vaster region which surrounds and influences our lives. The symbolic character of unconscious control which has reached pathologic proportions may be recognized as a defense reaction against a recognition of painful motives or as the persistence of modes of reaction which should normally have been discarded by development.

3. *The Theory of Psychoanalysis.*—The conclusion of this series of papers presents a few general remarks upon the applicability of psychoanalysis in all departments of the mental sciences whether theoretical or practical. Jung refers to its service in opening up the psychological structure of dementia præcox, with which is involved a further extensive field for psychoanalytic investigation, that of ethnical psychology, particularly in mythology and comparative religions. Jung then offers in brief the analysis of a girl of eleven as a concrete illustration of the psychoanalytic method of treatment. The case is not typical, since in the "whole lawless wealth of living reality" there can be no typical conformity to theoretical conclusions. Yet it is strikingly illustrative of the regression of the libido from the tasks of real life due primarily to innate inertia and only secondarily animating the early pathways, developing thus the infantile phantasies into real incest phantasies. The child developed resistances toward her beloved teacher because unwilling to direct her libido into useful work for him. She had partially converted these into physical inability and had moreover transferred her affection to a boy, toward whom the analysis revealed hidden phantasies. These, with which there seemed to be connected fear directed toward the father, showed striking parallels with racial phantasies of generation and birth expressed in primitive superstitions and mythology and folklore. This reveals how actively such ethnic inheritance is still at work in the individual mental life. It indicates the universal scope of psychoanalysis and suggests the collective background from which the individual mind develops.

4. *A Plea for a Broader Standpoint in Psychoanalysis.*—The author of this paper ranges himself among those who have studied closely the Freudian theory, but while he finds much to commend, finds also much to criticize and submit to that modification, harmonizing and reestablishing which he reminds us most new theories must undergo. He acknowledges that Freudism has given a new stimulus for a more humanistic psychology and has discovered mechanisms which are very illuminating in understanding the mental life. It has turned attention seriously to the psycho-sexual development and its influence, extending this study through normal and abnormal conditions, through infantile sexuality and into racial psychology, and more specifically has studied sexual aberrations. It has contributed extensively and profoundly to psychology generally and established a broader standpoint for mental analysis and psychotherapy while offering a new method for this. Its chief service is this of directing attention to analysis and interpretation rather than mere description. Freudians have, however, the author believes, been guilty of over-enthusiasm, extremism, almost fanaticism in their pressing

of their convictions. In order to support their conclusions they have attempted to force their clinical material into certain preconceived views and dogmas. Their psychology is defective and their method of reasoning loose, their terms are not well defined and their ideas lack formulated expression. They have unduly and even extravagantly extended the theories of psychical determinism and over-determinism, the rôle of the infantile, the theory of repression and resistance, symbolism and above all the sexual as the basis or setting of all human energy, even the vital energy of the universe. Meyer objects also that there has not been made a clear separation between the analysis and the physician's interpretation. It is his opinion that Freudians have neglected the instinct of self-preservation in their emphasis upon the sexual and extended application of the latter. They have not taken into consideration the whole psychophysical field of thought and investigation but have laid too much emphasis exclusively on the individual psychological. He would substitute for the term psychoanalysis the more comprehensive *psychobioanalysis* from the viewpoint that this would comprise the biological and therefore the wider racial method of approach, which he thinks Freudians have left out.

5. *Technique of Psychoanalysis*.—Emphasis upon the necessity of initial and continued self-analysis on the part of the analyst continues the presentation of this subject. The author then passes on to the early interviews and the taking of the conscious data. A passive but observant attitude allows the patient freedom of expression in his own view of the difficulties and discovers even in the rationalized conscious point of view hints of unconscious processes, which are also abundantly observable in many little otherwise trivial occurrences, gestures, changes of expression and what not. Some elaborated questionnaires may be of assistance, but are descriptive rather than therapeutic and should not take the place of a more casual and natural method of getting the patient's history. Care and time must be employed to ascertain whether the patient has the right qualifications before psychoanalysis is actually begun and especially with schizophrenic patients one should be very cautious about promises of a cure. The time limit of the treatment must be frankly considered and the question of cost, particularly in order to prevent the serious hindrance which may arise from a money complex. Some explanation of the unconscious hypothesis is necessary at the beginning of the analysis for which Bergson's formula of the admission into the present of only what is useful from all the past preserved in the unconscious, to the failure of which Freud applied the concept of mismanaged repressions, proves most often of service. This unconscious Jelliffe carries back for his patients into the millions of years of the formation of the biochemical mechanisms, which levels psychic disturbances also affect. The nine months of pregnancy recapitulate this period of racial history, while the first five years after birth, approximately, serve the recapitulation of the ages when the ego consciousness was evolved. It is the period when much of the material which psychoanalysis must search out is repressed into the unconsciousness. Each group of sensory receptors must learn to handle the energy thrust upon it and to build up its values from its simplest pleasure-seeking response to acts of highest and richest symbolic significance. Each energy or *libido* area seeks first its own satisfactions but must learn to adapt itself to other areas that the libido may be transferred from one area to another for adaptive ends. The author finds it of advantage to explain to the patient these tendencies as the various attempts at expression of his individual sense of power. Repression enters in when in the conflict between self-satisfaction from the infantile point of view and the larger racial purpose these tendencies are inhibited by pain psychically represented by fear. It is then necessary to trace with the patient each partial libido striving or trend in its relation to the two principles of self-preservation and of race perpetuation.

Jelliffe thus enters first upon the mode of analysis of the reproductive instinct, which at once involves a consideration of the fundamental Oedipus hypothesis. This is an hypothesis which serves as a unit measurement for all psychical phenomena normal and abnormal. It is not concerned with the child's conscious attitude toward its parents but with the unconscious and early biological trend of the individual away from the type represented by the parent of the same sex toward the opposite type. The author summarizes, in order to make this clear, Rank's emphasis of this in the "Myth of the Birth of the Hero,"¹ in which the "family neurotic romance" of the myth represents the same complex for the individual, particularly the neurotic child, who feels himself neglected or finds his inclinations unreciprocated. With the dissatisfaction which reality brings the child seeks to exalt his parents to his earlier phantastic ideal of them or to rid himself of the rival parent and enjoy in phantasy erotic relationship with the other. The biological necessity of separation of the individual from the parent lies at the basis of this romantic situation and the unsuccessful attempts result in infantile attachments of certain libido trends which lock up the libido from useful work. The partial analysis of a patient is given to illustrate the attachment of the libido thus to an early infantile nutritive level, where the patient unconsciously and symbolically hangs upon the mother and at the same time he gives evidence of the unconscious desire to rid himself of the father and brother.

6. *Contributions to the Psychology of Everyday Life: Their Relation to Abnormal Mental Phenomena.*—Miller bases his discussion upon four fundamental points in Freud's psychology, a rigorous determinism to all psychical events, the attachment of an affect to each such event, the accompanying of each psychical event by a certain amount of energy which may find successful discharge or, overaccumulated, lead to abnormal mental functioning, and lastly unconscious processes as the expression of our feelings or desires. Under these assumptions he examines a number of concrete cases of forgetting of names, mistakes in speaking, writing, hearing and reading together with certain symbolic acts and other allied mechanisms in order to explain them as evidences of just these psychological factors in the unconscious. He mentions the unsatisfactoriness of the long accepted explanation of mental aberrations as correlative with physiological changes and the effective psychological conception of mental disease which has been developed by Janet, Krapelin, Jung and Freud. He then proceeds to demonstrate the applicability of the Freudian mechanisms of repression and the activity of the repressed desires to the understanding of pathological mechanisms. The trivial mistakes of everyday are manifestations of repression. The existence of the unacceptable idea and its affect are evidenced also by the dissociation of consciousness, by the presence of delusions, hallucinations, by obsessions, which represent the modifying of the original idea, as do in another way the conversion phenomena of hysteria, and by projection and by the acute mental states where the consciousness retires and leaves the repressed content in complete possession of the field. This psychology of the unconscious and its mechanisms discovers the natural continuity which lies at the base of those mental phenomena which have been too long regarded as isolated facts.

7. *The Integrative Functions of the Nervous System Applied to Some Reactions in Human Behavior and Their Attending Psychic Functions.*—Kempf shows how the psychic functions discovered by analysis as operative in producing the psychoses and psychoneuroses harmonize with physiological and integrative functions of the nervous system. The characteristic outlet of emotional states is through the voluntary muscular system but this motor discharge may be interfered with, inhibited, and the overflow of nervous energy affects the involuntary psychomotor systems or visceral fields, causing

¹ Monograph Series, No. 18.

when persistent serious disturbance which may be a chronic distortion of the personality. Kempf assumes for his study that an emotional state is aroused by some kind of cerebral stimulus, that it is a type of reflex action and that it involves essentially cerebral adjustment toward essential changes in the viscera, glands and vasomotor system. He employs Sherrington's conception of a reflex which includes a receptor, conductor and effector so integrated as to work in types or systems under ordinary conditions. These receptors and effectors or common paths manifest a dual nature by which they act positively for certain stimuli but negatively refuse other stimuli. Like reflexes may reinforce one another and produce coördination and attention while diverting associations are inhibited. This dual principle is a universal one biologically, logically or psychologically. The resultant of two such opposing forces is the functional state. In psychical processes the reflex arc takes possession not only of certain final common paths but of that whose muscles would oppose the action of these and inhibits the nervous discharges which other reflexes have given them. Wherever two or more afferent neurones converge upon a third which is efferent to them either coalition or interference and conflict may result. This phenomenon is of psychic significance when many unconscious determinants are of those which cannot be adjusted and the phenomenon of fixation is developed. The discharge denied thus to the voluntary motor system seeks a distorted discharge through the involuntary innervation, as in the illustrative case cited in which a conflict had solved itself in an otherwise inexplicable and untractable lameness of the knee. The work of the analyst, the author says, is therefore a physiological as well as a psychological one, that is, to readjust the ideas or perceptions which cause the repression.

8. *A Manic-Depressive Episode Representing a Frank Wish-Realization Construction.*—Reed is able to present the results of a month's observation of a patient whose unconscious phantasy lying at the base of her psychosis had come clearly to the surface. His own summary may be quoted: "An unmarried woman aged 55 years, of a retiring and eccentric disposition with a strong emotional fixation first upon her father and then upon her mother, suffered, following her mother's death, some months of profound depression, characterized by restlessness, sleeplessness and certain vague ideas of persecution and hallucinations of hearing. During the depressed phase of her psychosis her thoughts returned to a love fancy forgotten or scarcely thought of for over twenty years. With this memory as a nucleus she constructed a systematized wish-realization phantasy involving a change in her personal appearance, wealth, the return to life of her mother and father, the marriage of her sister, good positions for her nephews, union in marriage with the object of her early fancy, his accession to the Presidency of the United States, travel, high position and children."

9. *Psychoanalytic Parallels.*—The object of this paper is to formulate the fundamental principles upon which psychoanalysis rests by showing that the modes of thought it discovers are deeply grounded in man's earliest psychology as illustrated by primitive and infantile conceptions and are thus utilized by psychoneurotics, who are still at the infantile and primitive levels. An anthropological comparison is necessary in order to discover these psychoanalytic parallels. The infant at birth is suddenly thrust into a world of reality from a state of omnipotence which its completely protected prenatal condition made possible. It soon learns that magic gestures and words serve to procure satisfaction for its wants, a method utilized likewise by the savage, and which contains also the roots of later hysterical expression in physical conversion of mental symptoms as the roots moreover of compulsive ceremonials. The infant must now build up an ego-concept through gradual differentiation from its environment, the early lack of differentiation being

again repeated in the symptoms of dementia præcox. Certain phenomena contribute to the infant's sense of ego-importance and are incorporated in its ego-concept, interest in excretory functions and its relations to its family being of prime importance. These present finally and intensify the great difficulty which the individual meets and which the future neurotic does not overcome in breaking away from the family attachment on the one hand and overcoming his intensive self-interest, auto-erotism, on the other. These lead to the incest problem in all its force and to infantile impregnation and birth theories built upon the functioning processes of the body. Both of these are widely diffused in primitive thought, White shows, and reveal its similarity with infantile thought and are in turn utilized by the psychoneuroses, which return to these levels of thinking. Thus the psychoanalytic movement seeks to recognize facts of human psychology and learns to deal with them.

10. *Psychoanalysis*.—Jung clears the ground for a statement of the principles of psychoanalysis by refuting certain misconceptions concerning it. It is not, he says, a form of anamnesis, that deals only with consciousness, nor is it a method of suggestion, to which in fact it is diametrically opposed. It does not employ the method of reasoning by argument and persuasion, which would too often cater to the neurotic desire for dependence. Psychoanalysis endeavors to enter the subconscious to discover and overcome the neurotic disorders. Conscious anamnesis and reasoning leave the problem unsolved just where the patient himself had brought it. The "subconscious" or unconscious determinants must be discovered through association and through the dream. Abundant hints from the unconscious will manifest themselves and these can be particularly followed through association with the elements of the dream. Psychoanalysis is concerned with the history of any psychical element which appears in consciousness through the dream or otherwise and this history lies in the individual unconscious or in racial history, as a brief analysis of the rite of baptism illustrates. Jung insists upon a recognition of the many-sidedness of the dream. It is necessary in the beginning of an analysis to regard it as a concrete representation of desires when the neurotic is influenced by his phantasies as if they had a genuine realistic value. Still even then one must not give an arbitrary interpretation of the dream. Symbolism is not fixed although frequent repetition establishes fairly general meaning. The sexuality itself in a dream is a symbolic expression utilized together with the entire volitional meaning as essentially a means of expression of the psychological effort which the unconscious and consciousness alike are making to adjust to the necessities of the individual problem. This conception of the dream in the further course of analysis leads the patient to direct his fundamental motive forces to serviceable biological ends as psychologically valuable factors. This very attitude of the patient is functionally valuable biologically and this should receive positive consideration at the hands of the analyst.

11. *The Rôle of the Sexual Complex in Dementia Præcox*.—Hassall presents a goodly number of concrete data which show that sexuality holds a central place in many psychoses, thus substantiating the genetic, dynamic theories of psychoanalysis. He reviews the genetic concept of the libido as used first by Freud in an enlarged sexual sense, but later developed by Jung as an energy concept found first in the nutritive sphere and later in its most important sphere, that of sexuality, from which it is transferred to other spheres closely connected with sexuality. This transference, if successful, is known as sublimation. With many individuals an interference with this process causes the libido to introvert to some earlier stage of the process at which there had been undue lingering of the libido and there a phantasy world is constructed. Moreover, certain mental states are not properly reacted to and are repressed to become if reinforced and strengthened active

factors in unconscious mental life. The sexual complex is of such strength that it unites with the strongest emotions and impulses. In dementia præcox the patient constructs an inner world dominated by such complexes which repress and replace reality, the level to which the libido introverts determining the type of symptoms of the psychosis. Jung discusses the presence of a toxin in connection with the affect of dementia præcox. Abraham believes that the individual returns to the auto-erotic stage. In any case the symptom-determining complex is in the foreground and is reached through the complex indicators. The patient associates with the complex and all his actions are constellated by it. Hassall then produces abundant evidence of the prevailing predominance of the sexual complex thus in the foreground in dementia præcox, often also associated with an unsuccessful religious sublimation of it. He concludes that in view of the fact that here, where reality has retreated in favor of the unlimited play of phantasy, "the patient reverts again and again to that central point of existence, sexuality, . . . we must not and cannot close our eyes to the fact that sexuality does play an important rôle in abnormal states just as it does in normal healthy mental life."

12. *Psycho-Genetics of Andocratic Evolution*.—Schroeder applies the science of psycho-genetics to the genetic history of our present-day mental and social attitude manifested in andocracy or male supremacy. He here states briefly conclusions reached in his studies in the psychic correlation between sex and religion. Undoubtedly, he says, sexual manifestations were among the first elements demanding conscious explanation in the origin of self-consciousness. The mystery as well as the high attainment of joy and, later recognized, of the creation of life through sex activities led to the reverence and worship of the visible mechanism. Hence these psychic states were gradually transferred to the male himself as bearing the sign of divinity. The fact that he is also the conqueror, the subduer, sexually, had its psychic effect. This is the biologic source for the attitude which has persisted in church and state contrary to our professed democracy even and which must be corrected by a truer estimate of objective social values on the part of women and the viewing of these problems by men and women alike without moral sentimentalism and theologic dogmatism.

13. *Some Studies in the Psychopathology of Acute Dissociation of the Personality*.—These studies are undertaken from the psychobiological aspect of psychopathic disturbance. The anatomical synapses between neurones have the function, according to Sherrington, of "variable resistance and connection," which gives to the nervous system great functional variability varying with the quality of energy, which in turn is dependent, among other causes, upon the stimuli and receptors stimulated. Exteroceptor sensations are reinforced by proprioceptive sensations which have their source in the stimulation arising from the internal activities of the organism. It is necessary then to analyze the content of consciousness in order that the individual may understand these sensory reactions of his receptive systems which constitute consciousness. The author adopts the dynamic conception of an emotion as the motive force seeking an adequate outlet. He then presents at length an illustrative case of the endeavor of such a biological motive whose inadequate expression had caused a confusional psychosis. The patient's hyperactive sexual motives were stimulated by exogenous stimuli and endogenous sensory images, fancies. These individual serene motives came into conflict with social motives which were active at the conscious levels and which to prevent dissociation by the individual motives sought to concentrate upon outlets which would be adequate for both, certain compromise phenomena, until finally the patient found health through a sublimation which satisfied both requirements. She illustrated the reinforcement of the satisfying path of discharge through sensory images when external stimuli were deficient.

Her choice of sensory images, too, ranged in orderly regression from images of recent impressions to those most remote and yet most satisfying, those of childhood. The author formulates a psychobiological law which is well illustrated in this case. "A motive, no matter at what conscious, subconscious or unconscious level of the personality it may be active, after its genesis, tends to express itself by forcing into consciousness sensations of exogenous origin or sensory images of endogenous origin which have the function of generating counter, neutralizing reactions." Thus this patient sought always the reinforcement through these images of those pathways by which her emotions could be neutralized, that is, adequately discharged, at the same time striving toward a discharge which would satisfy social as well as individual requirements.

14. *Psychoanalysis*.—Ring presents a lucid *résumé* of Freud's psychology and its terms relative to the latter's illuminating work with abnormal mental states. He defines these leading terms in their practical significance and then illustrates the application of these concepts by quoting in relative fulness the histories of three cases. One was a hysterical patient whose sexual conflict was so near consciousness that a comparatively simple analysis produced marked results, at the same time confirming Freud's theories of etiology and method of treatment. The second case was of a hysteria particularly of the anxiety type. The third was that of an obsessional neurosis no less illuminating in its self-written history but with too pronounced a manic character to be accessible to a complete analysis.

15. *A Philosophy for Psychoanalysts*.—The development of psychoanalysis has enlarged its scope to embrace the whole problem of the relation of the individual to society and the world. Therefore Emerson makes a plea for a broad pluralistic philosophical attitude on the part of psychoanalysts. Putnam's "disinterested love" which allows not only for individual points of view but, like James, welcomes them as all of value in their contribution to reality. The Freudian hypothesis of the unconscious grants support to panpsychism, while yet keeping in sight the twofold character of the mental life, that which represents desires and that which exists in self-controlled purposeful thought. Philosophy represents the varieties of sublimation forms of the desires of individual philosophers. Its systems are abstractions of such desires, but because of the individuality cannot be dogmatic. In the sphere of action account must be taken of all views and established morals. This proves that psychoanalysis touches likewise upon ethics. It must keep before its patients an ethical standard of social serviceableness which must be based upon a philosophical pluralism. Goodness is the harmonization of desires. This is the foundation of pluralism, ethical idealism and of the psychoanalytic therapy.

16. *Religion and Sex*.—The author of this digest values Schroeder's work as a truly psychological study of the subject of religion genetically considered. He states the systematic plan of study and research which Schroeder adopted and follows his working out of the same. First a definition of religion was sought which will disclose its essential characteristic. Schroeder examines the opinions particularly of religionists in order to eliminate certain factors considered non-distinctive. He finds thus doctrine, conduct, ceremonies, hopes entertained, even belief in God, belief in immortality unessential, since either these do not belong exclusively to religion, may be, as with ethics, in conflict with religion, or else they do not all belong of necessity to any one religious cult or faith. Religion, he concludes, is anti-intellectualistic and non-scientific, rooted in feeling and desire, a distinctively subjective experience. Schroeder then carefully follows his plan by stating his working hypothesis and checking up his interpretation by historical study of religion and in the light of evolutionary philosophy with a consideration of facts and

arguments brought forth by other observers and students. The hypothesis which Schroeder has formulated for this genetic historical and psychological study is as follows: "Throughout history in its differential essence, religion, everywhere, is but a sex ecstasy, seldom recognized to be that and therefore quite uniformly misinterpreted as something 'mysterious,' and 'transcendental' or 'superphysical'; this ecstatic state is also mistakenly thought to testify to the inerrancy of the various doctrines (often contradictory) and ceremonials with which it happens to become associated in the subject's mind."

17. *Some Freudian Contributions to the Paranoia Problem.*—In closing this series of presentations² the author calls attention to the testimony of the various authorities, who represent at least six different nationalities, to the connection between paranoia and homosexuality. This is not necessarily overt homosexuality, but it reveals the psychosexual significance of homoeroticism. The symptoms serve as a defense against instinctive tendencies and so perform a functional service as nature's attempt at healing.

18. *Wishfulfillment and Symbolism in Fairy Tales.*³

19. *The Significance of Psychoanalysis for the Mental Sciences.*—In this volume of the Psychoanalytic Review is presented the beginning of the profound psychological discussion in which Rank and Sachs trace the significance of the psychoanalytic interpretation as it comes into contact with the mental sciences. They outline the theory of the unconscious and its origin in earliest experience with its subsequent demarcation from consciousness when the infantile libido diffuse in its early aim becomes centralized in the primary sexual aim at puberty, and is further transformed in sublimation. Repression of the overpowering forms of gratification of instinct which marks the infantile mentality and of which sexual interest forms the nucleus is necessary in order to keep consciousness open to efficient contact with reality. Repressed wishes are, however, still active. The mechanisms by which they express themselves and influence conscious life when repression is not completely successful, are those of distortion and compromise, inversion of instinct into its opposite with representation by the opposite, projection, dissociation, displacement of affect and local displacement of sensations and perceptions. Other influences proceeding from consciousness, furthering this work of the unconscious, are secondary elaboration of the dream or other unconscious product, rationalization, dramatization and a mechanism which serves both the conscious and the unconscious, namely, symbolism. The authors enter upon a genetic consideration of symbolism through its many-layered strata of utilization and interpretation, quoting illustrative examples of these, which reveal the predominance and prevalence of the sexual element and which "characterize the great age, the rich content, the extensive and typical field of application, the cultural historical as well as individual importance of symbolism and show the continuance of the symbol-forming forces in the mental life of present-day civilized people."

The psychic products in which the above unconscious and unconsciously determined processes assert themselves are the mental abnormalities which separate the individual from reality all the way from the complete separation of the psychosis to the simple mistake or forgetting of daily life. A temporary product is the dream. On the other hand the inspirational force of the instinctive life is enlisted in the service of culture, all branches of which in earlier stages partook strongly of the phantasy nature, and some of which, notably religion and art, still reveal clearly the part of phantasy in their service to reality. Myths and legends are the first of these products contrib-

² See JOURNAL OF NERVOUS AND MENTAL DISEASE, Vol. 44, No. 3, September, 1916, p. 279.

³ Loc. cit.

uting to culture which the authors submit to the psychoanalytic touchstone. Psychoanalysis recognizes the necessity of psychological myth interpretation for the understanding of the unconscious. The myth must have arisen first at the time of racial development when need for repression set in. This leads to a consideration of the dynamic psychological forces which, as regards nature interpretation of myths, merely utilized the materials which nature offered or projected upon nature their wish-fulfilling tendency. The myth rests upon this same tendency which conditions the dream and is the slowly elaborated and altered product of the same mechanisms. Yet the dream is not intended for comprehensibility while the myth seeks the generalization of wish-fulfillment. The myth is also subjected to a constantly changing adaptation to successive cultural and ethical standards by which it undergoes progressively the process of "secondary elaboration" until at last, its function fulfilled, it is relegated to the province of legend and fable. The legend, however, recognized by the cultured adult as a phantasy product, discloses the human starting point of myth formation and leads back to a psychological entrance into myth interpretation. The investigation of the myth then follows through certain widespread typical examples.

LOUISE BRINK.

ULNAR NERVE PARALYSIS. J. Ramsay Hunt. (*Journal A. M. A.*, January 1, 1916.)

Tardy or late paralysis of the ulnar nerve, a form of chronic progressive neuritis developing many years after fracture dislocation of the elbow joint, is described by the author. The long period that elapses between this symptom and the injury may lead to diagnostic doubt and errors. Three cases are reported by Hunt, and the condition discussed. The symptomatology does not differ from other forms of progressive neuritis after the development of the paralysis. The essential etiologic factor in these cases is the deformity and malposition of the elbow joint in early life. The most frequent deformity is the cubitus valgus, in many cases associated with evidences of old fracture of the external condyle of the humerus. There is also some dislocation of the structure forming the ulnar groove, the olecranon is often displaced inward and the bony channel between it and the condyle is shallower than normal. As a result, there is produced an alteration of the course and bony relations of the ulnar nerve. The internal condyle may also be displaced or united in bad position, thus disturbing the relations of the ulnar nerve. Late paralysis may also follow deformity of the elbow joint from old arthritis. The peculiar and unusual feature of all the group of cases is the long lapse of time between the original injury and the first symptom of the neuritis. After this has once appeared it is likely to progress slowly and steadily unless the mechanical irritation is relieved by some form of surgical intervention. "Among the procedures advocated in the different types of cases are: enlargement and remodeling of the ulnar groove; resection of the thickened portion of the nerve trunk; transposition of the ulnar nerve to the anterior surface of the internal condyle and supracondylar, cuneiform osteotomy of the humerus to correct the valgus deformity." The diagnosis depends on the presence of an old joint lesion and the neuritic symptoms. In differential diagnosis the progressive final atrophies and the hypothenar type of neural atrophy (compression neuritis of the deep palmar branch of the ulnar) will demand consideration.

Book Reviews

MENTALLY DEFICIENT CHILDREN. THEIR TREATMENT AND TRAINING. By G. E. Shuttleworth, B.A., M.D., etc., and W. A. Potts, M.A., M.D., etc. P. Blakiston's Son and Company, Philadelphia. 1916.

It would seem that it was time in this fourth edition of so scientific a work to leave the purely descriptive levels, if the newer psychology means anything in our better understanding of mental deficiencies and better equipment for dealing with them.

The book is of value in its concise and yet clear treatment of the history of the movement in medicine toward recognition of mental deficiency or other abnormality in children and the gradually awakening responsibility and opportunity of the medical and educational world toward it. The authors give brief but authoritative description of these mental conditions, classifying them pathologically. They discuss the etiology, diagnosis and prognosis, but the chief interest lies in the discussion of the possibilities of treatment, particularly through industrial educational training and subsequent supervision. This includes a survey of the measures toward these ends being put into force in England and serving in their efficiency as models for consideration.

There is, nevertheless, a striking absence of recognition of psychical factors, beyond the most formal, in relation to etiology or the accessibility of the child's abnormalities to psychological interpretation and reeducation. Cerebral and other organic conditions and their expression in individual behavior receive due attention from the descriptive point of view. Behind these, however, lies a vaster psychic background which can no longer be thus completely ignored.

JELLIFFE.

AN INTRODUCTION TO THE STUDY OF THE ENDOCRINE GLANDS AND INTERNAL SECRETIONS. Sir Edward Schäfer. Stanford University Press, California.

The Lane lectures for 1913 were given by Sir Edward Schäfer and are here reproduced in a handy brochure form of 100 pages. They contain the general fundaments of the present day (1913) knowledge bearing on these structures expressed in an easy, attractive manner and from the lecture platform standpoint.

The volume is well worth reading as an introduction to the study of the endocrinous glands, although the monographs of Biedl, Falta, Pende, Levy-Rothschild, Laignel-Lavastine and others are more full and contain the clinical material, while Schäfer's lectures are largely physiological in their bearing. In the huge flotsam and jetsam of fact and fiction relative to the endocrinopathies this little volume will prove a standby of the more solid attainments in this rapidly developing and extremely important field.

JELLIFFE.

INDEX TO VOLUME 44

Figures with asterisk (*) indicate original articles and are accompanied with title. Figures unaccentuated, accompanied with title, indicate abstracts; without title, book reviews.

	PAGE		PAGE
A BDERHALDEN Reaction ..	185	Boston Neurological Society ..	74, 342
Abderhalden Tests in Psychi- atry	370, 563	Brain Tumor and Mental Dis- turbances	562
Abortion in the Psychoses from the Psychiatric, Legal, and Moral Standpoint	372	X-Ray in	501
Absinthe	186	Brain Weight in Mental Disease ..	372
Acroparesthesia	*193	Bronner, A. F., What Do Psy- chiatrists Mean?	*30
Acute Poliomyelitis in Norway ..	279	C ADWALADER, W. B., Sub- acute Combined Sclerosis of the Spinal Cord Associated with Severe Anemia	*424
Agrammatism	181, 184, 500, 504	Cadwalader, W. B., Intracranial Tumors of the Middle and Posterior Cranial Cavities, Growing from the Region of the Gasserian Ganglion and the Cerebello-pontine Angle ..	*11
Alcoholism	181	Carcinoma of Hypophysis	501
Alienists and Neurologists, Ex- pert Testimony by	375	Catatonia	184
Allgemeine Zeitschrift f. Psy- chiatry	181	Cerebellar Ataxia	280
Alzheimer, Dr. Alois	475	Deficiency	559
American Journal of Insanity, 374	556	Cerebello-pontine Angle	*11
American Neurological Associa- tion	243, 334, 437, 523	Cerebellopontine Tumors	*312
Andocratic Evolution and Psy- cho-genetics	572	Cerebral Softening	186
Anemia and Combined Sclerosis ..	*424	Cerebral Tumor	*415
Anosmia and Sellar Distension ..	*415	Cerebral and Cerebellar Cortex in Cases Dying in a General Hospital with Those Dying in a Lunatic Asylum	376
Aphasia	184	Character and the Neuroses	274
Apraxia, Localization of	180	Chicago Neurological Society, 63, 250, 455, 543	186
Archiv für Psychiatrie und Ner- venkrankheiten	5, 59, 370	Chorea	376
Arteriosclerosis	559	Chronic Progressive Chorea	376
Ataxia, Cerebellar	280	Cocain	500
Atrophy, Muscular	*108	Colloidal Gold and Spinal Fluid ..	558
P ARKER, Lewellys F., War and the Nervous System ...	*1	Color Complex in the Negro, The ..	278
Base Hospital, Neurological Types there	*495	Combined Sclerosis and Anemia ..	424
Bassoe, Peter, Diffuse Sarcoma of the Pia Enveloping the Entire Cord	*385	Compulsion Neurosis and Primi- tive Culture	277
Behavior Chart in Mental Dis- eases	558	Conduction Aphasia	185
Beebe, Dr. Brooks Ford	92	Cortex Measurement	501
Bell, Howard H., Hyperplasia of the Pineal Body	*481	Cortical Localization of Muscu- lar Tonus	510
Bernhardt, Dr. Martin	478	Criminality and Ecogenous Irri- tability	562
Blindness as a Wish	273	Cushing, Harvey, Anosmia and	
Bliss, M. A., Werdnig-Hoffman Muscular Atrophy	*108		

	PAGE		PAGE
Sellar Distension as Mis- leading Signs in Localization of Cerebral Tumor	*415	HEILBRONNER, Dr. Karl ..	95
Cushing, Harvey. Convulsive Spasm of the Face produced by Cerebellopontine Tumors	*312	Higier	82, 173, 263, 360, 459
DA COSA, J. Chalmers, In- tramedullary Tumor of the Cervical Cord	*97	Sympathetic Nervous System ???	
Dangerous Human Types	560	Hitzig, E.	559
Delusions and Explanation	184	Hoffman's Sign or the "Digital Reflex"	*51
Dementia Præcox, Pathogeny, 181, 376, 559, 564		Homosexuality in Paranoid Con- ditions	278
in the Negro	277	Hospital, Base, Neurological Types Seen there	*495
Sexual Complex	571	Human Types, Dangerous	500
Thymus and Pituitary in	558	Huntington's Chorea	376
Dercum, F. X., Intramedullary Tumor of the Cervical Cord, etc.	*97	Hydrocephalus	186
Dercum's Disease and Discus- sion of its Relationship to the Ductless Glands	185	Hyperpituitarism	558
Deutsche Zeitschrift für Ner- venheilkunde	272	Hyperplasia of the Pineal Body ..	*481
Diplegia, Facial	*322	Hyperplastic Systems	559
"Digital Reflex"	*51	Hypertonia, Intentional	*510
Dream as a Simple Wish-fulfill- ment in the Negro	276	Hypophysis, Carcinoma of	561
Dysostoses, Familial	560	INEBRIETY	376
ELECTRICITY, Neuroses	563	Infantilism	183
Encephalitis	370	Insanity in Children	375
Whooping-Cough	280	Insanity and War	181
Epilepsy, Operation	181, 560	Intentional Hypertonia	*510
Epileptic Dementia	*375, *517	Intracranial Injection of Auto- sero-Salvarsan	375
Ergotism	373	JELLIFFE, S. E., Compulsion Neurosis and Primitive Cul- ture	277
Erogenous Irritability and Crimi- nality	562	Journal of Mental Disease	470
Eunuchoidism	371	Jung, C. J.	571
Expert Testimony	375	KEYSER, T. S., Hoffman's Sign or the "Digital Re- flex"	*51
FACIAL Diplegia in Multiple Neuritis	*322	LATHYRISM	562
Fairy Tales, Wish-fulfillment and Symbolism	279	Libido	568
Familial Dysostoses	560	Luetic Zone	559
Forensic Medicine in Neuras- thenia	561	MANIA, Phases of	561
Freudians	567	Manic Depressive Episode and a Wish-realization Construction	570
Freudo-analysis, Pragmatic Ad- vantage of	275	Insanity	558
Freud's Psychology	573	Masturbation	556
Freudian Contributions to the Paranoia Problem	574	Melanosarcoma of the Central Nervous System	372
Funicular Myelitis with Bulbar and Polyneuritic Symptoms, 373		Memory Defect with Typhoid Fever	556
GANGRENE	186	Menstruation, Pregnancy, and Birth	371
Grenade Explosion, Fright From	182	Mental Diseases, Behavior Chart in	558
		Skull Capacity in	564
		Disorders, Psychic Factors in ..	556
		Disturbances and Brain Tumor in Ergotism	373
		Phenomena	569
		Monatsschrift für Psychiatric und Neurologie	184

	PAGE		PAGE
Moon Myth in Medicine	275	the Allorhythmic Type of	
Morphinism and Commitment ..	372	Paralysis Agitans	*104
Motor Aphasia with Agram-		Porencephalus	564
matism and Sensory-Agram-		Posterior Cranial Cavities, grow-	
matic Disorders	184	ing from the region of the	
Motor Speech Tracts	562	Gasserian Ganglion and the	
Multiple Sclerosis	370	Cerebello-pontine Angle	*11
Muscular Tonus	*510	Postero-Lateral Sclerosis Fol-	
Myelitis	373. *503	lowing Streptococcus Infection—	
		Transmitted to Rabbit	
N		as Myelitis	*503
NEGRO, Color Complex in ...	278	Posterior Root Fibers of Spinal	
Nerve Paralysis, Ulnar	575	Cord	563
Nervousness of School-teachers	185	Primitive Culture and the Neu-	
Nervous System and War	*1	roses	277
and Psychic Functions	569	Psychiatry, Modern	561
Neurasthenia in Forensic Medi-		Psychiatric Dispensary	375
cine	561	Psychiatric and Nerve Clinic at	
Neuritis, Multiple	*322	Königsberg	371
Neuroses	185	Psychiatrists, What Do They	
Electricity	563	Mean?	*30
and Character	274	Psychic Factors in Mental Dis-	
New York Neurological Soc.,		order	556
158, 352. 523		Functions and Nervous System	569
Noyes, Dr. William	94	Infection	181
Nystagmus	373	Psychoanalysis	271
		Plea for Broader Standpoint	567
O		and Hospitals	270
OPTIC Neuritis	280	and the Mental Sciences, Sig-	
Thalami	560	nificance of	574
		of Self-Mutilation	273
P		Technique of	568
PAIN-PLEASURE and Reality	565	Theory of	567, 571, 573
Paralysis Agitans, Cause of		Psychoanalysts, a Philosophy for	573
the Allorhythmic Type ..	*104	Psychoanalytic Parallels	570
Family Spastic ...*115. *224. *505		Review	271
Obstetrical	*289	Psycho-genetics of Andocratic	
Ulnar Nerve	575	Evolution	572
Paralytic Dementia	561	Psychologist and Physician, Co-	
Paranoia Problem, Freudian Con-		operation of	*34
tributions to	574	Psychology of Delusions of Ex-	
Paranoid Conditions, Rôle of		planation and its Relation to	
Homosexuality in	278	Disturbances of Orientation	184
Disease, Acute	560	Psychology of Everyday Life ..	569
Paresis	181, 182, 558, 561	Psychology, Freud's	573
Patrick, Hugh, Facial Diplegia		Psychopathology	572
in Multiple Neuritis	*322	Psychoses and Abderhalden Test	593
Peripheral Nervous System in		Putnam, James J., Acropares-	
Various Poisonings and Dis-		thesia	*193
turbances of Nutrition	372	Pyramidal Tract Degeneration..	564
Perseveration	185		
Personality Consciousness	186	R	
Studies in Psychopathology ..	572	REALITY and Pain-pleasure..	505
Perusini, Dr. Gaetano	477	Religion and Sex	573
Philadelphia Neur. Soc.	145	Review of Neurology and Psy-	
Philosophy for Psychoanalysts..	573	chiatry	373
Pia, Diffuse Sarcoma of	*385	Reviews:	
Pineal Body, Hyperplasia of ...	*481	Bianchi, Leonardo, Trattato di	
Pituitary and the Thymus in		Psichiatria	89
Dementia Præcox	558	Bruce, H. Addington, Mind	
Poliomyelitis	186, 207	and Health Series. Human	
Norway	279	Motives, by James Jackson	
Recurrent	*207	Putnam, M.D., The Meaning	
Pollock, Lewis J., The Cause of			

	PAGE		PAGE
of Dreams, by Isador H. Coriat, M.D., Sleep and Sleeplessness, by H. Addington Bruce	189	psychisches Geschehen. Die Phaenomene des Unterbewusstseins und ihre Rolle in unserem Geisteslebens	188
Carpenter, Edward, Love's Coming of Age. A series of papers on The Relations of the Sexes	288	O'Donoghue, Edward Geoffrey, Chaplain to the Hospital, The Story of Bethlehem Hospital from its Foundation in 1247	380
Chartres, A. Vivanti, Marie Tarnowska. With an Introductory Letter by Professor L. M. Bossi, of the University of Genoa	286	Parker, George Howard, S.D., Biology and Social Problems	474
Child, Charles Manning, Senescence and Rejuvenescence ..	285	Pearl, Raymond, Modes of Research in Genetics	473
Church & Peterson, Nervous and Mental Disease	284	Peritz, Dr. Georg, Die Nervenkrankheiten des Kindesalters ..	89
Dorland, W. A. Newman, A.M., M.D., F.A.C.S., The American Illustrated Medical Dictionary	283	Pighini, Dr. Giacomo, La biochimie del Cervello	90
Driesch, Hans, The History and Theory of Vitalism	191	Putnam, James Jackson, M.D., Human Motives. (Mind and Health Series.)	283
Dunlap, Knight, An Outline of Psychobiology	188	Römer, Paul H. Marburg, Epidemic Infantile Paralysis (Heine-Medin Disease). Translated by H. Ridley Prentice, London	90
Falta, Wilhelm, The Ductless Glandular Diseases	89	Shuttleworth, G. E., Mentally Deficient Children. Their Treatment and Training ...	576
Freud, Sigmund, LL.D., The Psychopathology of Every Day Life	281	Shäfer, Sir Edward, An Introduction to the Study of the Endocrine Glands and Internal Secretions	575
Hegner, Robert W., Ph.D., The Germ-Cell Cycle in Animals ..	190	Spence, Lewis, Myths and Legends of Ancient Egypt	473
Hill, Hibbert Winslow, M.B., M.D., D.P.H., The New Public Health	381	Starr, Louis, M.D., LL.D., The Adolescent Period. Its Features and Management	381
Jacobsen, Dr. Leo, Klinik der Nervenkrankheiten. Ein Lehrbuch für Aerzte und Studierende	90	Stoddart, W. H. B., M.D., F.R.C.P., The New Psychiatry	192
Jastrow, Joseph, Character and Temperament	284	Swanberg, Harold, The Inter-vertebral Foramen	188
Jolly, Dr. P., Kurzer Leitfaden der Psychiatrie	89	Walton, George Lincoln, M.D., Calm Yourself	188
Jung, Dr. C. G., Psychology of the Unconscious. A Study of the Transformations and Symbolisms of the Libido. A Contribution to the History of the Evolution of Thought. Authorized Translation, with Introduction by Beatrice M. Hinkle, M.D. ...	382	Ziehen, Dr. Theodor, Die Geisteskrankheiten des Kindesalters. Einschliesslich des Schwachsinn's und der Psychopathischen Konstitutionen ..	384
Kelly, Howard A., M.D., LL.D., Some American Medical Botanists Commemorated in our Botanical Nomenclature ..	189	Rhein, John H. W., Family Spastic Paralysis	*115, *224
Kelynack, T. N., M.D., Defective Children	282	Riggs, C. Eugene, Familial Spastic Paralysis	*505
Leonard, William Ellery, Socrates, Master of Life	287	SADISM in Oscar Wilde's Salome, The	271
Loewenfeld, Hofrat Dr. L. Munich, Bewusstsein und		Salvarsan	375
		Sarcoma, Diffuse, of the Pia ...	*385
		Schizophrenic Patients	568
		Sclerosis, Postero-Lateral, Following Streptococcus Infection	

	Page		Page
tion—Transmitted to Rabbit as Myelitis	*503	Types of Neurological Cases Seen at a Base Hospital ...	*495
Schmitt, C., The Cooperation of Psychologist and Physician. *	34	Thom, D. A., A Question of Epi- leptic Dementia with Recov- ery	*517
Schwab, Sidney L., Intentional Hypertonia	*510	Tonus, Muscular	*510
Sclerosis, Subacute, of the Spinal Cord	*424	Traumatic Neurosis	182
Sellar Distension	*415	Tremor in Paralysis Agitans ...	*104
Sever, James W., Obstetrical Paralysis	*289	Tumor, Cerebral	*415
Sexual Complex and Dementia Præcox	571	Cerebello-pontine Angle	*11
Sex and Religion	573	Intracranial	*11
Shields, C. L., Diffuse Sarcoma of the Pia Enveloping the Entire Cord	*385	Intramedullary, of the Cervi- cal Cord	*97
Significance of Psychoanalysis in the Mental Sciences	574	Melanosarcoma	372
Skull Capacity in Mental Disease	504	Types of Neurological Cases Seen at a Base Hospital ...	*495
Spasm, Convulsive, produced by Cerebellopontine Tumors ..	*312	Typhoid Fever	550
Spastic Paralysis *	115, *224, 505	Thymus and the Pituitary in Dementia Præcox	558
Speech, Central Mechanism of..	286	ULNAR Nerve Paralysis	575
Tracts, Motor	562	Unconscious	566
Spiller, Wm. G., Syringocephala, Syringocephalomyelia *	395	VESTIBULAR Head Nystag- mus and Facial Nystagmus in Pseudobulboparalysis ..	373
Spinal Cord and Posterior Root Fibers	563	Visual Cortex	186
Subacute Combined Sclerosis of	*424	WAR and the Nervous System *	1
Fluid and Colloidal Gold	558	Weisenberg, T. H., Clinical Value of Defense and Muscle Reflexes, in Spinal Localization	*217
Localization, Anosmia and Sellar Distension as Misleading Signs in Localization of ...	*217	Wassermann	558
Muscular Atrophy	*108	Werdnig-Hoffman Early Infan- tile Spinal Muscular Atrophy *	108
Stern, Felix	562	Whooping-Cough Encephalitis..	286
Streptococcus Infection	*503	Wildsbuch Crucified Saint	275
Suicide, The Prevention of	376	Wish-fulfillment and Symbolism in Fairy Tales	278
Sympathetic Nervous System, Higier	82, 173, 263, 360, 459	Williams, Edward M., Postero- lateral Sclerosis Following Streptococcus Infection— Transmitted to Rabbit as Myelitis	*503
Syphilis, Nervous	379	Wish Blindness	273
Syringocephalia	*395	Wishfulfillment and Symbolism in Fairy Tales	574
Syringocephalomyelia	*395	Wish-realization Construction in a Manic Depressive Episode	570
TABES and Paresis in Legal Medicine	182	X-RAY in Brain Tumor	561
Taylor, E. W., Recurrent Polio- myelitis	*207		
Technique of Psychoanalysis, 273.	564		
Thalami, Optic	560		
Thomas, John Jenks, Obstetrical Paralysis	*289		

RC
321
J78
v. 4

THE JOURNAL OF NERVOUS AND
MENTAL DISEASE

Biological
& Medical
Serials

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY
